

PC PILOT

The Magazine for Flight Simulation in association with www.simflight.com

F/A 18 SUPER HORNET VS. JANE'S USAF

Make sure you don't get stung — we give you our verdict!



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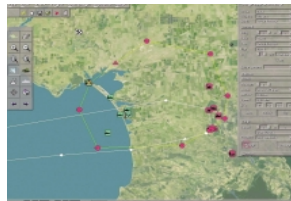
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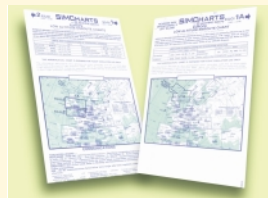


Special Pullout

Jeppesen Charts Glossary

➔ Centre Pages

First of a two-part key to the symbols that populate the en-route charts included in this issue.



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Editor's Letter

Welcome to the third issue of PC Pilot.

"It's always great to see a real face behind an excellent magazine," he said. That was one of the first comments we received meeting many readers of PC Pilot at the RC Simulations Flight Simulation Show in Birmingham last December. We had a wonderful time meeting you all. You simply blew us away with kind comments. Thank you all for your encouragement, praise and suggestions. We have taken your comments on board and are acting on them in this and in future issues. Without your feedback we cannot provide the ultimate magazine for simmers - so keep your suggestions coming!

One reader asked for a special section explaining how to install graphics card drivers. Yes, we remembered and your request is in this issue!

The flight simulation market is large with over 15 top selling titles fighting for the top slot. Microsoft, the world's biggest software manufacturer, has the biggest stake in the civilian flight simulation market. It is estimated that Flight Simulator has sold around 15 million copies worldwide and in some stores is even out-selling its newer cousin, Flight Simulator 2000. As you'll see from our charts Flight Simulator 98 is still number three, giving its younger sibling a run for its money.

Why should a company, with such a strong hold on the flight simulation market, have to release a fix to sort out problems with Flight Simulator 2000 three weeks after its release? Microsoft refuses to comment. Though, to be fair Microsoft seems not alone in this given the vast number of patches also appearing for Fly!

Comments coming from newsgroups, forums and add-on developers around the world suggest that Flight Simulator 2000 is an undercover beta (test) version of the next release in 2002 - much in the same way Flight Simulator 95 was also classed as a 'beta' by simmers, for Flight Simulator 98 as both the program 'engines' seemed remarkably similar.

Readers of PC Pilot have raised this issue and felt so strongly about the so-called 'rip-off factor' that they have written in to express their opinions. Some are very strong opinions too; so strong we could not print all of them! However, thank you all for your excellent letters and e-mails. Keep them coming in. We will of course forward them to Microsoft and the Flight Simulator team for a reaction.

In this issue you have been spoilt. We've sold our soul to Jeppesen, the aviation chart manufacturers, to provide you with 3 full sized en-route charts covering the entire UK and parts of Europe. Running alongside these charts we have created a special two-part glossary that will help you understand how to use them, together with an additional tutorial from commercial 737 pilot, Paul Hannity.

We have the results of our Flanker 2.0 and Jeppesen competitions and a brand new contest where you can win some professional hardware to assist your virtual flying experience courtesy of CH Products!

Best wishes for the millennium and safe flying.

Mike Clark
Editor
mike@pcpilot.net

The Crew

Mike Clark

Mike has been a journalist for 15 years with a background in PR and marketing. Mike became hooked on Flight Simulator in 1995 and in 1997 started work on a free e-mail flight simulation newsletter called TheMag. Since then TheMag has grown to a regular circulation of over 53,000! Mike has written many reviews and interviewed some of the biggest names in flight simulation and real aviation. Mike's style is to tell how it is and has made PC Pilot's mission to present, inform and advise readers on all computer flight simulation related issues.



Chuck Dome

Chuck Dome is a legend. He has been around since the beginning and is known around the world as a leading figure in Flight Simulation. Chuck has created aircraft, scenery, panels and utilities for the flight simulation industry since 1990. He has also had many articles published in "other" flight simulation publications.



Greg Cott

Greg has held a private pilot's license for 11 years and enjoys cruising around the New England countryside in Skyhawks and Archers. Greg is a genius with hardware and knows many different types of system... being one of the first "overclockers". Some of his much-praised articles can be found at www.simflight.com.



Joe Lavery

Joe has been a flight simulator enthusiast since the BBC Micro days and became interested enough to complete a Private Pilots course in 1996. He began his writing career covering mainly graphics and CAD reviews due to his background in this area but more recently has hosted a flight simulator column covering all aspects of simulated flight.



Trevor Morson

Part owner of a DC-3 (N763A) Ozark Airlines, operated by the Prairie Aviation Museum, Illinois. Author and developer of 'DC-3' - an expansion pack for Microsoft Flight Simulator 98. Trevor hosted a popular flight simulation forum at simflight.com and has written many editorials and reviews for flight sim products and general aviation.



Bill Stack

Bill Stack has written numerous books and articles about business, management and marketing and has trained thousands of business and government professionals. With his flight simulation books, he applies his training background to help fellow flight simmers reach their greatest potential in flight skills.



Kenji Takeda

Kenji is an experienced computer journalist who has worked for such magazines as PC Gaming World, Computer Life and PC Review and is also a contributor to Gamespot UK. He holds a Master of Engineering degree in Aeronautics and Astronautics, a PhD in Aerodynamics and is a professional member of the American Institute of Aeronautics and Astronautics (www.aiaa.org). When he's not flying for PC Pilot, he is busy performing research in aeroacoustics, developing techniques to model aerodynamic noise and finding ways of reducing it to help make our airports quieter in the future.



Tony Hawes

Now retired from the RAF, for the past seven years Tony has edited ROM, the monthly newsletter of the Guildford PC User Group. Prior to retirement he was training officer in a major (UK) government department with a particular interest in the application of computer graphics to Computer Based Training. An avid flight simulator fan, Tony's first experience of PC flight simulators dates back to 1987 when he first flew the then BAO/Microsoft Flight Simulator. He has regularly upgraded since then and is now enjoying the wonders of FS 2000.

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Poor Show Microsoft



We’ve had plenty of letters, none very complimentary, concerning Flight Simulator 2000. We include the two below to give a feel for the strength of feeling.

FROM: Tom Chorley

"Having spent the best part of the weekend attempting to download the FS2000 Pro patch of some 8+ Mb. I am just about to blow my turbo charger.

I think that Microsoft must take all of us PC pilots as total mugs. Sure, as previous users, we obtained a rebate of £15; but I personally must have consumed most of this in failed downloads and I'm sure that others must have suffered the same fate.

My problem revolves around Internet Explorer 5 dropping the connection at about the 90% point. I have a resume feature installed but it will not work from Microsoft’s web page.

Can you with your next issue please, please obtain this upgrade patch and supply it on a cover disc? That will certainly save my sanity!!!

In spite of my moans I have great hopes that this latest offering from Microsoft will be first class when all the bugs are cleared."

FROM: David Ambrose

I am a little worried. I began flight simulation with FS95 and then FS98. Then I got one or two combat sims, including Microsoft's version. I'm not a hardcore simmer but the sim's ability to portray realistic scenery has always been important to me. So Combat Simulator was a hit with me.

So when FS2000 was on the way I thought the scenery would be as good as Combat Simulator.

I loaded it up at home on my Pentium II 450, 128Mb RAM, TNT 16mb. What a display of utter apathy on the part of Microsoft, the richest company in the world.

An apparent re-hash of FS98 and an attitude of "This'll do for them - they'll still buy it!" And we will. But I didn't - I took it back, pronto, and it will take a lot for me to buy another Microsoft flight sim again.

Mike Clark's review is what has got me worried. How can he arrive at such a good verdict? I hope it's because he has one of those top systems at

the bottom of frame rate test table on page 33. If his system is anything like mine (which I think it fair to say is about average for simmers), he must be hyping this sim up for the sake of the whole flight sim industry, surely? The only objective voice is that of Chuck Dome, who has got it exactly right. Is it merely coincidence that Chuck mentions Combat Simulator? Because the thought also occurs to me that maybe some civilian sim reviewers are exclusively experienced in civilian sims.

They should try the later combat flight sims out there for realism, Janes' USAF, F/A 18, Flanker 2 and last but apparently best, B17 II. Surely, if a little Bristol-based company can produce such excellence, and the whole combat sim world is excited by the screen shots supplied so far by Wayward, then how come Microsoft's billions come up with mediocre fare like FS2000?

I now exclusively fly combat sims (Falcon 4, Mig Alley, Combat Simulator) because I cannot find a civilian sim that has decent graphics. Flight Unlimited III might, but who wants only Seattle area?

I don't mind anyone disagreeing with me; but before you do - look at the graphics of Mig Alley and then look at FS2000 countryside around Chicago, or London. Is it my eyes, or Mike Clark's?

It can't be where he lives. I'm from the same town!

We Reply:

The main issue is that FS2000 does require a good PC set-up - really a Pentium III - though one would have thought your PC set-up more than adequate. The aspect that has got most people heated is that Microsoft publishes unrealistic system requirements. The fact is you need a top PC set-up to get the best out of FS2000. Anything else is plain misleading.

We have queried all the comments we have had with Microsoft, but have received no comment from them as we went to press.

Mike’s review does highlight the frame rate issues - but does conclude that it is a good product overall (i.e. looking ahead a little bit) that offers much for the hobby. We do think that there are certain poor aspects and that there is definitely a 'rushed' air about the product's release – but ultimately it does offer so much for the money, IF you have a good PC. Chuck's view is rather extreme, but a valid point of view - that is why we included his angle in our review.

If you remember back a couple of years there was much the same outcry with FS98, with many claiming it was worse than FS5.1/95 - but now generally everyone loves it. So we are back to the same sort of situation we think with FS2000.

As for combat sims, well we cover these and have a good overview of all the different products on offer. B17 II is wonderful, but like most combat products offers a limited flying area (though the graphics engine is a real step forward).

More on 747 PS1 Please

FROM: Matthew Knight

"I have recently found your magazine and must say, it is rather good. However I also recently splashed out a large sum of money on Aerowinx's wonderful Precision 747-400 simulator, and was more than disappointed not to even find a mention of this product.

So how about more concerning this, such as .ini files containing challenges, or .rou files containing interesting routes?"

We Reply:

We will certainly try and cover more on the higher-end serious sims such as PS1, Airline Simulator 2 and X-Plane in future issues.

A Charitable Offer

FROM: Graham Day - friendly_skies@hotmail.com

"Congratulations on the launch of the magazine, long may it continue.

I work at British Mediterranean Airways at Heathrow (with three A320s) and have collected the old charts, booklets and letdown plates from Aerad that we periodically change.

It struck me that these may be a useful source of info for PC Pilot users in that they can follow actual ATS routes on a real live chart and plot with it if necessary. The actual variation from the old chart/plate to the new one is often minimal and I know that they are expensive to buy.

I have a large box full and would like to advertise them for sale - not for personal gain - but in support of the orphanages that we look after in Tblisi in Soviet Georgia. I would purchase sweets for the children from my local cash'n'carry in bulk and my staff would distribute them on the next visit.

I would like to get rid of them in one go, so perhaps someone interested in taking this on board would be appropriate, with one payment for all of them."

We Reply:

Sounds like a worthy cause and we suggest you get in touch with Graham directly to find out more. Give him your best offer, for what seems a great collection of charts and books. We're even tempted ourselves!

Customer Service

FROM: Reg Burgess

"Congratulations to you and the crew on the production of a very good flight simulation magazine. I must admit that I was tempted towards the American magazine Full Throttle. Glad now that I chose the British product.

In common with others, ('Where are you Papa Tango?') I have been in touch with Papa Tango with reference to rubbish information in the Flight Academy manual. I did receive a reply thanking me for my constructive comments and

indicating that corrections/fixes would appear at their web site. Nothing has happened to date. I checked and their News page has still not been updated. Last update was 24th July 99.

By complete comparison, way back in January of this year I purchased Falcon 4 and immediately identified a problem in that the introductory video would not play and that I could not run any of the video *.avi files. I was in correspondence with Richard B. of Microprose between 31st January and 20th April when the problem was finally resolved. What at first seemed to be a simple driver or hardware compatibility fault turned out to be quite a complex problem, but one with a relatively simple solution. Richard B, I think, devoted considerable time to my problem in order to come up with the answer. A great credit to Microprose."

We Reply:

Thanks for letting us know, Richard and congratulations to Microprose for what seems pretty dedicated support. We love to hear of your experiences so keep those letters coming!

Charles G. gives us this tip for contacting Papa Tango – thanks Charles!

"Try giving Ian Purves an e-mail at Papa Tango - ianpurves@papatango.freemove.co.uk - I had trouble loading the scenery files for Flight Academy, dropped them a letter and next day got a reply so I can't grumble. Must admit that I couldn't find an email address on the site to send to, but got one now!"

Flying Friends Wanted

FROM: Eric Jelley - eric@jelley99.fsnet.co.uk

"I am 79 years of age and have installed Microsoft Flight Simulator 98 on my computer. I am having great difficulty in learning how to use it. Have not managed to get off the ground yet!

Can you please point me in the right direction to find a flight sim enthusiast in the Liphook, Haslemere, Alton or Petersfield area in the UK who could help me?

I am very impressed with PC Pilot, but as you can imagine as a new boy the technical articles are way beyond me but I am determined to learn! I really want to understand the basics of flying."

FROM: Bevin John - bevin@emirates.net.ae

"I am just curious, do you have any other subscribers from the United Arab Emirates? If there are, I would like to get in touch with them just to exchange ideas regarding flight simulator. If you do get similar requests from any other simmer from UAE, you are free to pass on my e-mail address to them."

We Reply:

A few readers have written wanting to get in touch with other like-minded enthusiasts. We're pleased to include the two letters above and hope you will give both Eric and Bevin your support and friendship.

Virtual Airlines Seek Pilots

FROM: Willie – Biggles544@talk21.com

"As you know there is an ever increasing number of Virtual Airlines (VAs) on the net. These VAs fly all over the world in large, medium and small airliners.

I have just started up Virtual Air Force (VAF), a group of highly skilled pilots who fly, using Flight Simulator 98 and an Internet connection, in formations and perform other aerobatic manoeuvres.

The VAF is still very new and therefore we have few staff, currently we are looking for good pilots who have Flight Simulator 98 and would be willing to fly for about 2 hours a week. If you think you are good enough, or would like more info please contact VAF@talk21.com"

FROM: Michael Parker – tennis@aberdaretennis.co.uk

"I am very interested in advertising for my Virtual Airliner in your magazine. As you well know Virtual Airliners don't make any money, only spend, so can you please give my VA a mention?

My web site is www.virginatlantic.8m.com. From the address I bet you guessed which VA it is - Virgin Atlantic Virtual Airliners! We are not officially endorsed, or associated with Virgin, but welcome all virtual pilots."

We Reply:

Happy to oblige both Willie and Michael. If you are looking to join a Virtual Airline then drop them a line, I'm sure they'll give you a warm welcome!



AND THE WINNERS ARE...

In the previous issue we had some fabulous prizes for our readers from the generous bods at Jeppesen and Mindscape.

There were plenty of entries to both competitions. Bad luck and our commiserations to the chap who entered seven times for the chance to win the Su-27 model - journalists have particularly keen eyesight and notice these things!

Thank you to everyone who entered, here are the answers and winners:

SU-27 Competition

There were a wide variety of answers, but the ones we were looking for were in kilograms and are as follows:

1. Each AL-31F engine produces 12,500 kg of thrust

2. The maximum take-off weight of the SU-27 is 30,000 kg

We did accept answers close to the above.

The winner is Len White from Lancashire – congratulations, your model is on its way to you.

Jeppesen Competitions

Unfortunately, question two actually highlighted a printing error in the IFR tutorial on page 51. The printed 1,67 ft should actually be 1,678 ft. Ooops! Thus we accepted answers of 167 ft, 1,670 ft and the correct answer of 1,678 ft. We also decided to be generous and allow those who had rounded up to 1,680 ft too!

The answers were:

1. Brookman’s Park VOR frequency is 117.5

2. As above the answer is actually 1,678 ft. This is shown on the Jeppesen IAP on page 49.

3. 250,000 people visited Stansted in June 1983 to see the Space Shuttle arrive.

Mike Lucas receives the Jeppesen flight bag (much coveted by all in the office!) and Pich Damrongmaree from Bangkok wins the FliteStar VFR software. Finally, S Richardson of Oxfordshire is the winner of the chunky Aviation History book.

There is another great competition in this issue, so if you were not a winner this time then give it a go again. You won’t win if you don’t enter!

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NEWS

For daily news updates log onto
www.simflight.com

FLY FIGHTER ACE II FOR FREE



Microsoft's massive multiplayer combat sim, Fighter Ace II has gone live and is available for download. To celebrate the game's launch, Microsoft's Zone is offering the first month of gameplay for free. Fighter Ace II is a World War II air combat game that allows more than 300 pilots to fight in a single air combat arena from the cockpit of any one of more than 34 World War II vintage fighters and bombers.

In Fighter Ace II, pilots battle for airborne supremacy by coordinating battle plans with their wingmen and squad mates. Fighter aces must defend their territory, secure new strategic positions, and blast bogies in an on-going war between British, German, United States, Russian and Japanese aircraft. Fighter Ace II's aircraft include the De Havilland Mosquito, the F4U-4 Corsair and the legendary Zero. Players can completely customise

the load-out of their planes including auxiliary fuel, bombs and rockets. With an entirely new physics, flight and damage model, along with aircraft mounted rockets and territorial combat with player triggered tanks, Microsoft claim that their sim brings a level of realism not yet seen in an online-only air combat game.

Fighter Ace II is only available on the MSN Gaming Zone. For more information on the game, visit the Fighter Ace II website.

Website: www.zone.com/fighterace/

Price: Free three-day trial and then subscribe for \$1.95 per day or only \$9.95 per month.

FS CLOUDS 2000 ON THE HORIZON

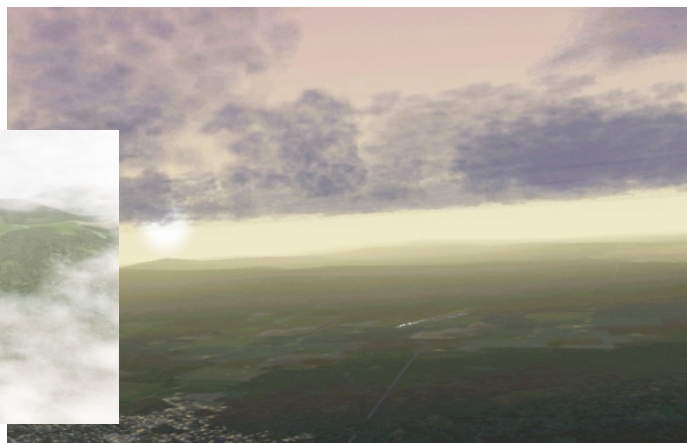
We can exclusively reveal the first screen shots from Flight One's new development – FS Clouds 2000 for, appropriately enough, Flight Simulator 2000.

Apparently but a month or two from completion, the developers have been keeping tight-lipped. We do know that we can expect better and much improved clouds over the Microsoft fare. Flight One say that FS Clouds 98 was one of

the most popular add-ons for Flight Simulator in the past couple of years, so no doubt this new version will be eagerly awaited by many.

Publisher: Flight One

Website: www.flight1.com



DEDICATED SEARCH ENGINE FOR UK SIMMERS

The UK's first dedicated flight simulation search engine is now open to the general public. Simsearch.co.uk is a searchable online 'database' of specific web sites or files. As it is based in the UK, British and European flight simmers should be able to experience faster, easier and generally better search results. The

site also allows webmasters with a flight simulation related web site to freely register their details into the database. The service has been devised and is run by The FS Globe Network (www.fsglobe.com).

Network: The FS Globe Network
Website: www.simsearch.co.uk

VIRTUAL BROOKS AIR EXPANDS

Virtual Airline, Brooks Air, has announced the expansion of its UK operations from a new hub based in the north east of England at Newcastle International Airport. The new hub operations will serve both internal domestic and near-European destinations.

Brook's tell us that new aircraft dedicated to this hub have been secured and flight plans are

already in place, as well as a scenery add-on which can be downloaded from the company's website. ATC adventure files are currently being written and are scheduled to be available soon.

Virtual Airline: Brooks Air
Website: www.users.globalnet.co.uk/~mbrook
E-mail: mbrook@globalnet.co.uk

COMPLETE CONTROL IN 2000

Garry Smith, author of Control 98 and Control 2000, has marked the start of 2000 with the release of Control 2000 Millennium Edition. Control 2000 is a utility developed for the management of Flight Simulator 98/2000 and Combat Flight Simulator aircraft, panels, sounds, textures and the multitude of configuration files used in each of the three simulators.



Developer: Garry Smith

Price: \$70.00 (prices may vary according to exchange rate)

Web Site: www.potts.net.au/gsmith/control2000/Millennium/Control_2000ME.htm

CAN YOU HEAR ME?

SimVoice is an intriguing new shareware product, made available from Kirby Angell. As Kirby explains, "SimVoice is a utility to make it easy for users of simulator products to record their own voices. This means that you can put your voice into the cockpit of products like Radar Contact 99, ProFlight, and Fly VFR2. SimVoice is script driven. With the registered version, you can create scripts to support any simulation product

that uses prerecorded phrases stored in individual files. SimVoice takes the user through all the steps to set up their recording hardware, record each phrase in the script and save the resulting phrase files with the correct file names." Sounds intriguing!

Developer: Kirby Angell
Web Site: <http://jpython.dhs.org/simvoice/>
Price: TBA



AIRLINE FLIGHTS IN 2000

German flight simulation experts, Aerosoft have announced their first new product for Flight Simulator 2000. Airline Flights 2000 provides over 20 different adventures flying in and out of destinations such as London, Glasgow, Paris, Tokyo, Frankfurt and Munich. Each adventure

works in Flight Simulator 2000's GPS and Planner mode and includes complete flight plans and airport charts. Aerosoft tells us that all the adventures are spoken by real controllers.

Publisher: Aerosoft
Website: www.aerosoft.com
Price: £24.99

DOWNLOAD NOTAMS

Abacus Announces FS2000 Compliance

Abacus, makers of Airport and Scenery Designer have announced that their entire product range is now compatible with Microsoft's Flight Simulator 2000.

Publisher: Abacus
Website: www.abacus.com



FS Traffic — latest update released

Work on FS Traffic does not seem to stop. A small update was released this month that addresses a number of minor problems such as mismatched runways and scenery settings.

Publisher: Lago
Website: www.fstraffic.com

New Patch 2.04 for Airline Simulator 2

Nomissoft, the developers of Airline Simulator 2, have released Patch 2.04 for this complex sim. Nomissoft say improvements have been made to changes in wind – which are now more gradual, even for surface winds. They have also added a new driver, 'airline.drv' allowing random and planned emergencies, more weather effects and the monitoring of flight performance during single assignments. A list of bug fixes is also contained in the update.

Developer: Nomissoft
Website: www.nomissoft.com/service.html#as2downloads

Downloadable FS2000 Puzzle

Flight Simulator 2000 has inspired a free download of Pandora's Box, Microsoft's best-selling puzzle game. Take a look – you get the fun of a Pandora's Box puzzle and a stunning FS2000 image when solved!

Publisher: Microsoft
Website: www.microsoft.com/games/-pandorasbox/pandemo_flightsim.exe

SERIOUS SIMMING



If you are into serious simulation then you may want to check out the latest generation sim, 'RTS Pro', from Virtual Application.

Programmed by IFR pilots, RTS Pro is intended for virtual or real pilots who want serious training and practice. The developer's claim that the program offers a complete and realistic simulator, modelling the popular Beechcraft Bonanza A36 (single engine) and Baron 58 (twin) aircraft.

Developer: Virtual Application
Web Site: www.rtspro.com
Price: \$299.00

SUPERCAR TAKES TO THE SKIES

Gerry Anderson fan, Austin Tate has released a Microsoft Flight Simulator 'Supercar'. If your memory fails you, Supercar was the first animated TV series from the famed creator of Thunderbirds.

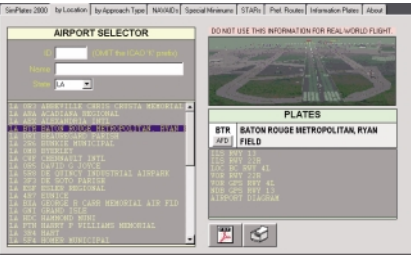
Austin's Supercar project started in 1995 and has had ongoing updates. It is now ready to 'fly' in Flight Simulator 2000 and Combat Flight Simulator - complete with custom weapons! Austin has also made available the full Aircraft Factory 99 parts and textures data, for those interested in improving the model.

There is even a 'Supercar Challenge', supported by a FS2000 GPS flight plan. The challenge includes nice locations and fine scenery in the western USA.

Website:
www.aiiai.ed.ac.uk/~bat/GA/-supercar-msfs.html

SIMPLATES UNDAUNTED BY RIVAL

American developer, Dauntless Software has released 'SimPlates 2000', an airport and facilities directory for the United States of America. Going head to head with products like SimCharts from Jeppesen, it features 8,000 IFR plates including all kinds of approaches. Dauntless say, "users of the program can print out approach plates (or export them to Adobe Acrobat format) for reference during simulated flight." SimPlates is suitable for use with simulators such as Flight Simulator 95/98/2000, Fly!, Pro Pilot 99 and IFR-specific flight simulators such



as those from Jeppesen, Elite, and ASA. Sadly the product only covers the USA, but is cheaper than its rival from Jeppesen - though we've yet to see if it is any better!

Publisher: Dauntless Software
Web Site: www.dauntless-soft.com
Price: \$35.00 (only available direct from publisher in the USA)

THE CHARTS



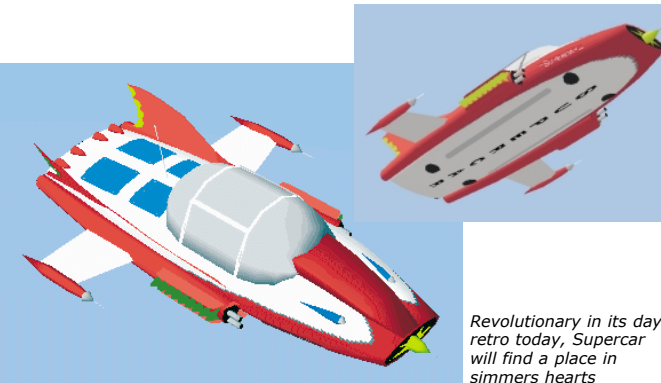
In conjunction with ChartTrack we present the Top 10 best selling flight simulation titles, taken from data for the month of November 1999.

As expected Microsoft takes the top 4 slots, though the appearance of older titles such as Flight Simulator 98, F-16 Fighting Falcon and Flight Unlimited 2 might surprise some. This is invariably down to the 'budget' price that these titles are now sold at - for example Flight Simulator 98 is now only £14.99 and F-16 Fighting Falcon is available for only £4.99!

TOP 10 PC CD-ROM FLIGHT SIMS

NO.	TITLE	COMPANY
1	MICROSOFT FLIGHT SIMULATOR 2000	MICROSOFT
2	MICROSOFT FLIGHT SIMULATOR 2000 PRO	MICROSOFT
3	MICROSOFT FLIGHT SIMULATOR 98	MICROSOFT
4	COMBAT FLIGHT SIMULATOR	MICROSOFT
5	FALCON 4.0	HASBRO INTERACTIVE
6	F-16 FIGHTING FALCON	SOLDOUT
7	FLIGHT UNLIMITED III	ELECTRONIC ARTS
8	FLIGHT UNLIMITED II	EIDOS INTERACTIVE
9	F-22 LIGHTNING III	NOVALOGIC
10	FIGHTER SQUADRON	ACTIVISION

Information provided courtesy of ChartTrack and ELSPA. ©2000 Chart Track/ELSPA.



Revolutionary in its day retro today, Supercar will find a place in simmers hearts

ITEC 2000

If you are interested in serious and professional flight simulation then you will be interested in the ITEC 2000 Conference at The Hague (in Holland). The conference takes place between 11th and 13th April and includes an exhibition



featuring companies such as Boeing, Evans & Sutherland, Sun, British Airways and Thomson. It is a rare occasion to see some of the latest developments and no doubt take in some serious simulators! The exhibition is free of charge, though check the ITEC site for full details on registering.

Web Site: www.itec.co.uk
Entry: Free

THE ULTIMATE FLIGHT SIM DESIGN STUDIO?

Abacus has announced they will publish Louis Sinclair's FS Design Studio, a dedicated design utility for Flight Simulator 2000. Available in Standard, Pro and Commercial versions, Abacus claim, "FS Design Studio delivers a full graphical and interactive environment for creating all kinds of 3D scenery objects. With the Pro version, you can also make flyable aircraft." Early details seem to indicate that this could be just what scenery and aircraft designers have been waiting for!

Publisher: Abacus
Website: www.abacus.com
Price: from \$59.95 (UK prices are yet to be announced)



FLIGHTBOARD 2000



Aerosoft has released a fabulous looking USB accessory for simmers, the Flightboard 2000.

According to Aerosoft, the Flightboard replaces the keyboard almost completely and much improves the experience of flying airliners. It includes divided control units for both jets and props, ensuring optimum control on all aircraft designs. Functions include engine power (including reverse thrust), flaps, trim, auto-coordination, spoiler, OBS and NAV radios, ADF, transponder, EGT, autopilot functions and virtually

every other required control. We've briefly played with an early unit and can say that although it might seem expensive, at around £100, it is a nice addition to one's sim. There are both serial and USB versions, though we'd definitely opt for USB if your PC has this socket. A UK supplier is expected soon.

Developer: Aerosoft
Web Site: <http://simmarket.com/-hardware/aerosoft/>
Prices: approximately £100, depending on exchange rate

NEW CELERON 533MHZ

Intel Corporation has introduced the Intel Celeron 533Mhz, its fastest processor ever for the sub-\$1000 PC. "Intel intends to remain aggressive in the value PC market segment in 2000," said Pat Gelsinger, vice president of Intel Desktop Products Group. The Celeron provides a cheaper alternative than a Pentium III for users seeking a processor upgrade, with more cache although running at a lower 66Mhz bus speed.

Web Site: www.intel.co.uk



HARDWARE NEWS

For daily hardware news updates log onto www.simflight.com

LATEST GRAPHIC CARD DRIVERS

Perhaps the easiest and quickest way of getting a mild performance boost is to update your graphic card drivers, which can also sort out other problems you may be having with your simulator.

Annihilator

Riva3D reports that the Creative Labs Unified Driver Database appears to be fixed, and will now allow Annihilator owners to download the Unified drivers, which provide GLide compatibility. Also, users have been reporting that entering the serial number from their registration card (not box) now works.
Manufacturer: Creative
Web Site: <http://order.soundblaster.com/escrpts/download-unified.asp>

ASUS

ASUS has released a new set of drivers, as well as a BIOS update for their GeForce 256-powered V6600 and V6800 graphics cards.
Developer: Asus
Web Site: www.asus.com/Products/Addon/Vga/asuse/enthusiast_drv.htm

AND THE REST...

Check out the following sites if you are after the latest news and drivers for your card:

Nvidia GeForce

Guillemot 3D Prophet: www.guillemot.com
Creative Labs Annihilator: www.europe.creative.com
Elsa Erazor: www.elsa.com

Nvidia TNT2

Guillemot Maxi Gamer Cougar: www.guillemot.com/uk/index.html

3dfx Voodoo3

Voodoo3 3500: www.3dfx.com

Matrox G400

www.matrox.com/mga/products/mill_g400/home.htm

S3 Savage 2000

Diamond Viper II: http://209.10.46.175/default.asp?menu=viper_II&sub_menu=&item=

ATI Rage Fury MAXX

www.ati.com/na/pages/showcase/maxx/index.html

Fed up with all 'out of the window fancy graphics' AND NO REAL flying?
If it is flying realism you want then Airline Simulator 2 is the simulator you have been waiting for!

Professional Flying...



AIRLINE SIMULATOR 2 ...Real Simulation

- Developed by real airline pilots and aviation professionals over three years.
- The most realistic aircraft handling ever achieved on a PC-based flight simulation with all new flight models of MD-83, MD-88 and B747-400 aircraft. Plus additional aircraft, including B737, B767, B747-357, A320 and Shorts 360.
- Vast scenery base with enhanced 256 colour Europe and North Atlantic scenery over 1,600 airfields covered in detail! USA Continental scenery now included too!
- Highly sophisticated flight equations based on true inertia systems and detailed airflow calculations and forces programmed with accuracy up to FL500!
- Wind turbulence, rain and snow as well as runway surface calculations allow realistic ground handling.
- Explore the edges of the aircraft flight envelope... You deal with asymmetric lift, asymmetric drag, flamed out engines and much more.
- Aircraft Abstraction Layer (AAL), the technology behind the new flight model, makes flying easy and teaches the right real world handling techniques used by real world pilots.
- Autopilot, Main Control Panel (MCP), Flight Management Computer (FMC), Thrust Computer, Ground Proximity Warning System (GPWS), Traffic and Collision Avoidance System (TCAS) and many more systems.
- Aural Alarms (e.g. GPWS, TCAS, configuration alarms), voice communication with the first officer and improved sounds for touch down, stall warning and other aircraft related sounds have been implemented using real world sounds.
- Fly with TRUE 3D! Red-green anaglyph glasses are included to let you take advantage of the 3D Advanced Graphics System module included.

- Multi-player flight simulation via IPX Network. Up to 4 planes can see each other with external visuals together with proper TCAS simulation. The included Scenery Viewer (called Ernie) allows you to view scenery and is useable as a radar screen for networked multi-player sessions.
- Comprehensive manual including 150 pages of authorised reproductions of Aerad airport and ILS charts. Further, 3 authorised reproductions of Aerad en-route charts covering Europe and North Atlantic are included as well as checklists for the MD-83, MD-88 and B747-400 aircraft.

Developed by **NOMISOFT**
Danur CFS **virtuali**



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not require any other
product to run!

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Fax: +44 (0)1480 463070

mail@theassociates.co.uk



The MD-83 Captain's panel on climb out...



MD-83 centre panel with comms, autopilot and engine read-outs.



The Boeing 747-400 Captain's view at Zurich with glass cockpit panel.



The Boeing 747-400 centre panel view shows important information clearly.

FS2000 Patch Released

Mike Clark dons his pirate gear to give us a detailed analysis of Microsoft's latest 'fix' and what it offers.

Microsoft recently announced a much anticipated patch for Flight Simulator 2000. This patch claims to fix a number of elements in Flight Simulator 2000 and the wires have been hot as simmers attempt to download this fairly substantial update.

Supplied in two separate files, either for the 'Standard' or 'Professional' versions of the simulator, Microsoft have attempted to alleviate the woes of virtual pilots by addressing key issues that affect the use of their key simulation.

The 'Standard Edition' patch weighs in at a chunky 6.9 Mb and takes around an hour to download on systems with a 56k modem installed. The 'Professional Edition' patch jumps on your hard drive at a mean 8.8 Mb and takes around an hour and a half on a similar modem.

The first and most important aspect the patch claims to address is the issue concerning performance. As we mentioned in our review of Flight Simulator 2000 in issue 2, we discovered that the graphical representation (Microsoft like to call it 'Bilinear Filtering') of some gauges was causing stutters or pauses as the aircraft turned in flight.

Within the patch Microsoft has included a set of updated gauges to replace the current ones affecting performance. There are five new gauges for the 'Professional Edition' and four for 'Standard' users. These new gauges have been modified to accept a command or a 'switch' that can be turned on or off in the FS2000.cfg file - a configuration file found in the root of the Flight Simulator 2000 directory. The switch is turned on or off by using a simple number command: 1 for 'On' and 0 for 'Off'. The lines in the FS2000.cfg file will look as follows when edited:

[PANELS]

IMAGE_QUALITY=0

This turns off the Bilinear Filtering to each of the updated gauges. When changed to 'Off' the difference you see when flying depends on your system set-up. Some users with high specification PCs have reported virtually no change at all, although others with less powerful systems have reported a minor increase in performance. The gauges after modification do look different though. Depending on your screen resolution, they

might be a little harder to read, as the 'smoothness' of the numbers and dials look jagged with Bilinear Filtering turned off.



Gauge WITHOUT Bilinear Filtering enabled. Note the jaggedness of the '21' at the top of the gauge

Gauge showing the quality WITH Bilinear Filtering enabled. Note the smooth '21' at the top of the gauge

There has also been an update to the way coastlines are displayed in Flight Simulator 2000. Microsoft has added a coastline polygons switch that controls the level of detail and accuracy of coastlines. Turning this switch 'Off' is supposed to improve the frame rate, but reports coming in from users say different. Many users say that this switch makes little or no difference at all. In fact, some users are saying that land masses are now becoming islands when this switch is turned off!

[MISC DATA]

USEPOLYCOASTDATA=1

Note: you can edit the FS2000.cfg file by opening it with the Text Editor in Windows. Make sure you keep a backup of the initial file - if you make a mistake you may need to re-install Flight Simulator 2000 or the .cfg file.

There has also been an update to Flight Simulator 2000's weather system. Microsoft says, "The Real-World Weather feature displays weather more accurately in areas where weather stations do not report 24 hours a day. If a weather download does not include a report for a specific station, the weather system now uses reports from nearby facilities to create a more accurate representation of the current weather in the area..." This is true and we can confirm that there is an improvement when downloading weather data. However the patch has not addressed the bug that gives zero visibility over 10,000ft (which we mentioned in our review).

There have been other updates in this patch including fixes to gauges in nearly all the aircraft. The flight and ground-handling characteristics has been improved for all the aircraft but most importantly Concorde and the 777-300.

The Flight Planner has had some minor improvements, but not all issues have been addressed and there are still many complaints from users about navigation accuracy not being fixed correctly.

The general scenery has not been fixed. However we saw that the Flight Simulator 2000 Professional Edition received a strange update of a large number of textures for the Tokyo scenery!

There are still missing ramps and taxiways at airports. There are also airports that remain floating or lie underneath ground level and there are still inaccurate ILS localisers throughout the simulation.

We've had many letters from users of Flight Simulator 2000 that feel that they have been short-changed by the product and the eagerly anticipated patch. Developers are still desperately waiting for the SDK (Software Development Kit), which is holding back development of compatible add-ons.

This patch goes some way to improving the lot of Flight Simulator 2000 owners, but not nearly far enough in our opinion. A shame too that it is so large a download - Microsoft should remember that not all of us get free phone calls!

Mike Clark

DOWNLOAD THE UPDATE FROM HERE

Before installing the update, make sure that you shut down Flight Simulator and any other applications, including utilities, dial-up connections, anti-virus software, etc.

The file is self-installing. Save it to your hard drive and then double click on its icon to begin installation.

Flight Simulator 2000 Update (6.9 Mb)

Flight Simulator 2000 Professional Edition Update (8.8 Mb)

Both are available from here:

http://www.microsoft.com/games/fs2000/downloads_fsupdate.htm

Amsterdam

It's coming up tulips in Flight Simulator 2000

Occasionally, from the vaults of Lago come some interesting products. FS Traffic was a pleasant surprise from the Lake Como-based company better known for its scenery add-ons. More recently this company has moved away from traditional publishing with the introduction of shareware products, tapping into the huge Internet flight simmer base.

Amsterdam Schiphol Airport for 2000 is being billed as the next generation of products for Flight Simulator 2000 to make Dutch flyers' experience as good as it gets. Technically considered a niche product, because of its limited area, we were interested to find out what the 'value for money factor' is for a product that is in competition with something like Airport 2000 by Wilco, and which is expected to include eight times as many airports.

Incorporating some ground breaking scenery design techniques, experienced scenery designer, Andras Kozma appears to be taking full advantage of the new 32 and 16 bit sub routines available in the Flight Simulator 2000 scenery engine. Soft and mellow lighting, with beams, are the first thing that hit you when taxiing around the airport at night. Buildings, based on the originals, look extremely good and

For the past few months Lago have been working on three secret (until now!) projects: Italy 2000, ATC 2000 and Amsterdam Schiphol 2000. Mike Clark donned his deerstalker hat and pipe and did some detective work. He now brings us his exclusive details of Lago's Amsterdam project.

eerily realistic. Ground textures around the airport look a little prefabricated, but like most scenery these days it seems some detail is being sacrificed to keep frame rates to an acceptable level.

Airline gates, that include details right down to the cables are incorporated in abundance. From the images we have seen



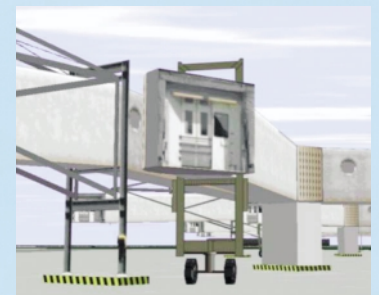
Taking advantage of the 16 and 32 bit scenery engine give remarkable results

so far there does not seem to be much bleed through of the smaller textures – a common problem in Flight Simulator 98. But we reserve judgement until we see the final software.

One of the nice touches of this product is the inclusion of special docking systems at each gate. These little details are not usually incorporated into scenery as, again, it can be a real frame rate killer. They look very professionally produced, although, like most airports produced in the past we shall see if they do the job accurately!

Check out the lighting effects on the lamps... the beams are very smooth and realistic

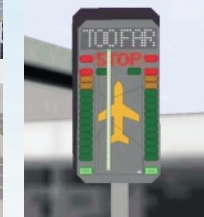
Schiphol



Looks great, though we wonder about the frame rates



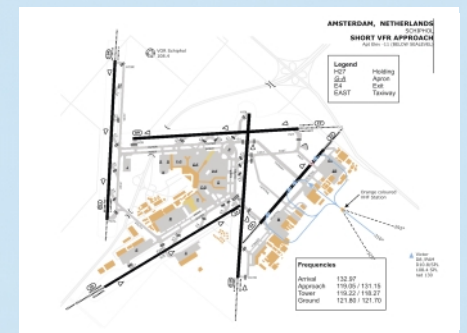
Buildings look eerily realistic.



Easy gate positioning is assisted with the special docking system

Despite these promises PC Pilot remains to be convinced. We have learnt that larger jets and dense scenery do not work well together in Flight Simulator 2000. Why should this add-on be any different? We wonder whether Lago have a secret trick or whether this is pre-release hype.

FS Traffic (reviewed in the last issue) has been a success on the Internet and it looks as though Lago will be incorporating this same technology as part of the dynamics of this airport. We are told that Schiphol will be fully operational with moving trucks and buses all over the place. Lago is also boasting that active scenery will include a full day of actual KLM traffic. This means that you will be able to use a timetable to see when a plane will arrive and be able to wait for it at the gate (if you know what gate it's expected on). From what we understand the timetable will be included. This will be a novel but possibly gimmicky addition to the product. After all, aren't



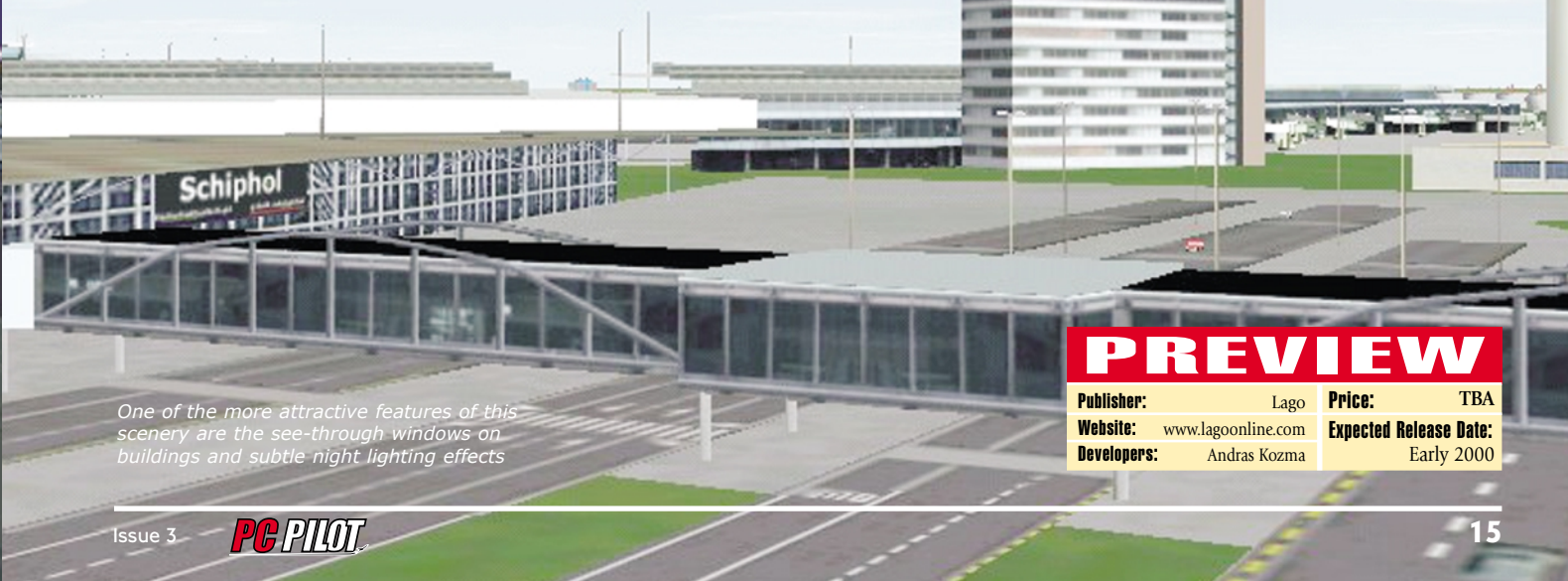
A full array of approach plates and charts are expected to be included with this product on release

pilots supposed to be flying instead of plane spotting? It's an exciting idea nonetheless.

As with any airport you need to be able to find your way around. We have learnt that Amsterdam 2000 will include a full array of approach plates including SID's (Standard Instrument Departures), STAR's (Standard Terminal Arrivals), airport orientation, taxi, parking, ILS and VOR/DME charts. Lago say that they will include over 40 charts.

Amsterdam 2000 has lots more secrets to discover. However, like most simmers, the biggest question is whether it will run smoothly on our systems.

Mike Clark



One of the more attractive features of this scenery are the see-through windows on buildings and subtle night lighting effects

PREVIEW

Publisher:	Lago	Price:	TBA
Website:	www.lagoonline.com	Expected Release Date:	Early 2000
Developers:	Andras Kozma		

MegaScenery Pacific Northwest for Fly!

The scenic route to VFR flying?

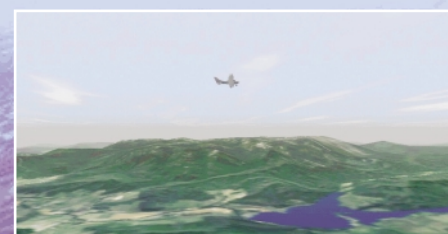
Real pilots know that most flight simulators lack the visual detail for genuine VFR (Visual Flight Rules) flights. Generally only major towns and airfields offer sufficient visual clues. The

whole point about flying VFR is that you use buildings, roads, rivers, and lakes, combined with a limited set of instruments to navigate from one place to another. You need the ability to check your present position using the identifying features viewed from the cockpit against the prepared course drawn on your map. However, until recently we have had to fly over what appears to be an unrealistic, multi-coloured patchwork quilt, made from repetitive scenery tiles, that doesn't really fool anyone and is next to useless for simulated VFR flying.

Many scenery developers have tried to improve matters by creating a variety of so-called 'detailed' scenery add-ons. Unfortunately, even those created with the aid of satellite imagery generally fall far short of a genuine VFR experience.

Fortunately, Australian software publishers PC Aviator are about to try and change all that with the release of a series of high definition scenery expansions for Terminal Reality's Fly!

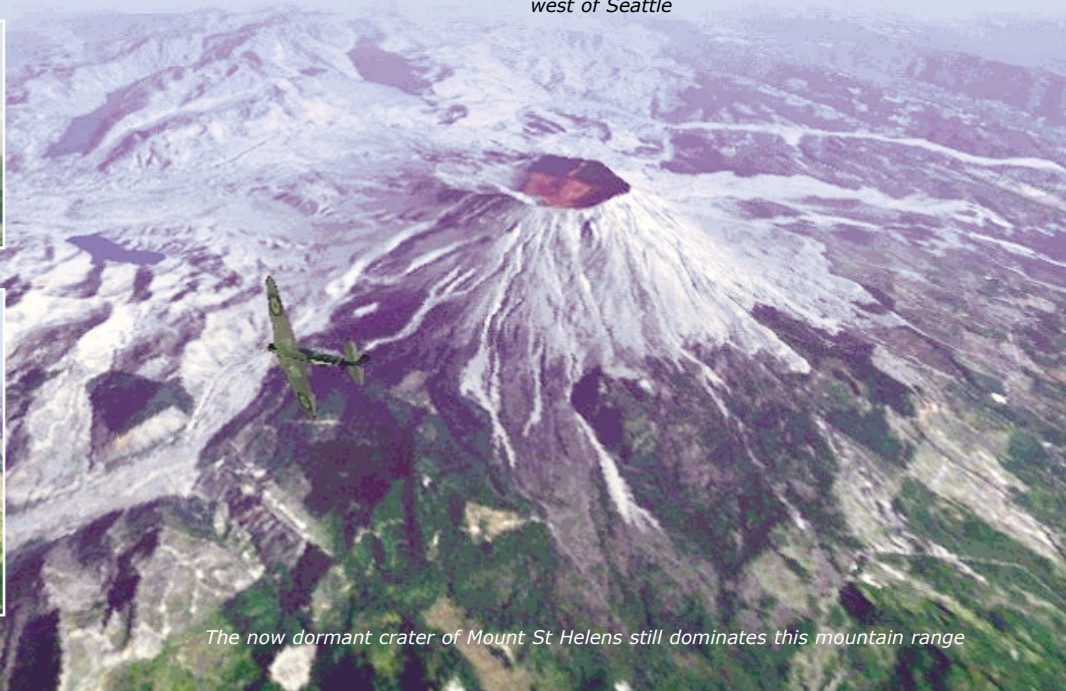
Their first offering, to be released early in 2000, depicts the Pacific Northwest region of North America. Covering 65,000 square miles, it will include Washington State, Northern Oregon and Southern British Columbia in Canada, all of which have been recreated using actual satellite imagery from 'Landsat'. This produces a landscape the publishers claim is the most realistic to date. You find all the famous natural landmarks including Mount



A lonely Cessna flies over Mount Buffalo



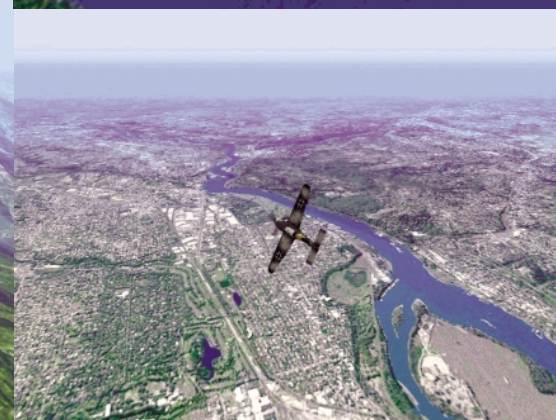
Mount Rainier is found to the south of Seattle and is the highest peak in the area



The now dormant crater of Mount St Helens still dominates this mountain range

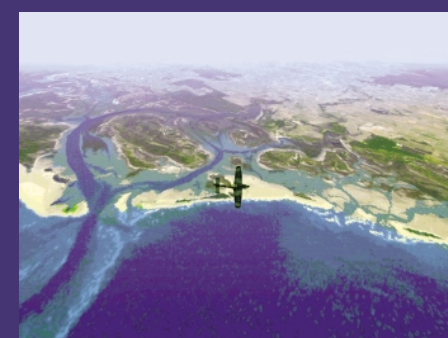


Here we see the Olympic Mountains just west of Seattle



Portland lies on the southern border of this scenery package

Rainier, Lake Chelan, Mount Adams, Mount Hood and Glacier Peak. Fly up the Columbia River from the Okanogans to Astoria following the western coastline to the Wenatchee, Okanogan and Olympic mountain ranges. The area extends for over 240 miles in each direction and using high-resolution Digital Elevation Model



Coastlines are not that easy to model, as these shots of Townsend Point and Ninety Mile beach demonstrates



Use genuine aeronautical maps with the MegaScenery, flying over realistic landscapes

data, the detail is accurate to within a few feet. The intention is to give a true VFR flying experience to the point where you can identify every ripple on the ground and reference it on your aeronautical chart.

In addition to the multitude of natural features, the cities of Seattle, Portland and Vancouver have been captured in 5 metres-per-pixel photo-realistic resolution. The authors boast that the detail is so good you should be able to identify individual buildings in some cities. This high definition is achieved by making full use of the huge storage capacity of the CD-ROM from where the majority of data is directly accessed as required without taking up valuable hard drive space.

If all this technology works, let's hope the authors turn their attentions to the UK soon. Our beautiful country is also worthy of a good going over!

We have yet to see this scenery add-on in it's finished state, so at present we have no



The approach to Vancouver as seen from Victoria



The airport at Seattle



The densely populated view of Vancouver

way of gauging the frame rate. However, if the screenshots are representative of the quality we can expect, then the authors have done a remarkable job. We hope that we only suffer a small performance penalty.

Joe Lavery

It should be noted that most of the screenshots were taken from the Microsoft Flight Simulator version of the MegaScenery Pacific Northwest, because these were all that were available at the time of going to press. The Publishers assure us that the two versions should be indistinguishable.

PREVIEW			
Publisher:	PC Aviator	Price:	£39.99
Website:	www.megascenery.com	Expected Release Date:	
Developers:	PC Aviator	1st Quarter 2000	

View from the Top

Steve Halpern, is CEO of Flight One Software, an ardent flight simmer and a talented programmer. In the first of this new series of contributions from industry figureheads, he gives us a fascinating perspective on the latest developments in flight simulation.

The dreams and passions of flight. This is what has brought many of us to the world of flight simulation. My own flight simulation experience started out with Flight Simulator 5.0a and the CompuServe Flight Simulation Forum, long before Flight One Software was even a concept. For many of you no doubt your flight simulation experiences go back much further, to the Atari and Commodore.

I remember FS5.0a well. I recall flying at night, looking at all the bright runway lights. I remember a red flashing light on top of a building in Chicago, as I would take off from Meigs. I would fly just above it, letting it pass below my left wing. I remember making accurate landings and approaches. I also remember (and miss) those headaches... the 486 PC, the boot disks and the endless system file adjustments. It was all DOS, and sometimes there was work to do to get things right. But the rewards were good once everything was dialled in. The sim was a shared effort, among the programmers and us, the sim aviators.

I spent a year flying for the virtual Noble Airlines out of the SFO hub. I would sit at my computer staring at basic scenery, no 'real weather' and no new aircraft. But my imagination was working. I was part of an aviation experience. I was on a journey.

But my imagination was working. I was part of an aviation experience. I was on a journey.

The world is changing. The Internet has allowed the advance of third party development – both free and commercial. The fact that many people can instantly share technology around the world is tremendous. Now, almost any plane, cockpit style or scenery area is available. Hardware technology has made equal progress.

So what does this mean for simmers? I'm sure many of you say, "I've got the hardware that makes it almost photo-realistic, as well as so many additions which I can purchase or download. Great! What's the problem?"

Look at human nature. It is fair to say that when something is fun, we want this fun in our lives and will look to have more of it. So as these programs grow, we think the more that it offers, the more fun we will have. But what may be occurring is that the program itself is trying to sculpture this fun, rather than the natural creativity within us. We are no longer the pilots of our course, but followers of the marketers, programmers and designers.

We are no longer the pilots of our course, but followers of the marketers, programmers and designers.

The fight for companies to compete and stay on top drives them to put almost every last little gimmick or element they can into their programs. Menus get more and more graphical, features more plentiful (and exhaustive). And somehow, I get the feeling that some programs are growing too elaborate for their own benefit. Even I am (as a developer) a bit guilty of applying this sometimes!

In many cases, these gimmicks and visuals sidetrack us, and without knowing it we stop using our imagination. Everything is served to us on a silver plate, looking so good that we think all our fun and experience is just what we've been served. We think we have it all, when in fact in some cases, we have actually lost the best elements of the simulator.

This best element is ourselves. This is because without us, all that exists is a bunch of transistors. The 'sim' is not the real experience; it is us interacting with it that is.



I have found myself at times not content to just sit back on a basic flight to and from a destination, but instead to search the Internet for a download. Because I see so much available, I look there, instead of looking at the marvels of flight within me.

As both a developer and publisher, there is more and more of a challenge to keep the proper balance in a product. Features are great to add, and of course we want to put as much as we reasonably can into a title. But I also realise that there must be a good balance, and ensure the program gives the user the freedom necessary to let their imagination lead the show, not the 'sim'. Therefore, they experience the moment, instead of watching it, giving them a more valuable experience.

Maybe it is good to remember the above perspectives a little. Look at your flight as a journey through unknown skies, using your best navigational skills to arrive safely at that waiting airport in the distance. After all, flight simulation is still about man and machine.

Steve Halpern

Find out more about Flight One at www.flight1.com

The Low Down

A Guide to Jeppesen Low Altitude Charts

This issue of PC Pilot includes two full size Low Altitude charts from Jeppesen. We suspect that, unless you are a seasoned pilot, your first thoughts on seeing them are that they're rather complicated! We welcome Paul Hannity, an experienced 737 pilot for Aer Lingus, who will hopefully help you get the most from the charts.

The charts are used by most airlines (or equivalent organisations) for IFR (Instrument Flight Rules) flying. Most commercial airlines follow IFR procedures, which means there is no requirement to 'look out' the window, except obviously for the critical phases of flight such as take-off and landing. Nearly all the rest of the flight is conducted by interpreting the information presented to the pilots on the flight instruments in the cockpit.

The Low Altitude charts generally cover airspace below 24,500 feet, (depending on which country you're in) and accurately show the geographical borders and airspace boundaries of each country. This airspace is known as the FIR or Flight Information Region. Within this FIR you will find a myriad of navigation aids. One type of navigation aid is known as a VOR (Very high frequency Omnidirectional Range beacon).

The VOR is depicted on the chart as two concentric circles with a segment pattern filling the area between the two circles, and small triangle in the centre (see Figure 1). Each one has a name with a frequency and an arrow pointing to its geographical position e.g. DUBLIN D 114.90 DUB. 'DUB' is the 3-letter identifier of the VOR. This identifier is transmitted to pilots in Morse code when they tune in the VOR on frequency 114.90 MHz. This allows them to verify that the VOR is working correctly and hence provide accurate navigational information. Most VORs work in conjunction with Distance Measuring Equipment (DME) to give an accurate fix based on a bearing and distance. To know whether DME is available with the VOR, a small capital D is located inside the information box.

You will notice that there are a number of lines, radiating out from a VOR. If you follow one of them you find that it eventually meets up with another VOR. In fact, if you look at the chart in its entirety you will see that these lines connect to VORs all over the chart. These lines are very important in commercial aviation as they represent the centrelines of airways, the motorways of the sky. Each airway has a name, e.g. R14 (Romeo One Four) or B1 (Bravo One). An airway is a 10 nautical mile-wide corridor, i.e. 5nm either side of the centreline, and within its boundaries aircraft fly under the guidance of Air Traffic Control in controlled airspace. Altitudes of 1,000 ft separate aircraft flying in the opposite direction. To find out which altitude to fly, the chart shows a circle indicating the odd and even flight levels, depending on the direction of flight (see Figure 2 on page 20). (Hint look for this information northwest of Ireland - space is at a premium on the chart and although all the information is present, it can be hard to find).

Each airway has a magnetic track associated with its centreline. On the

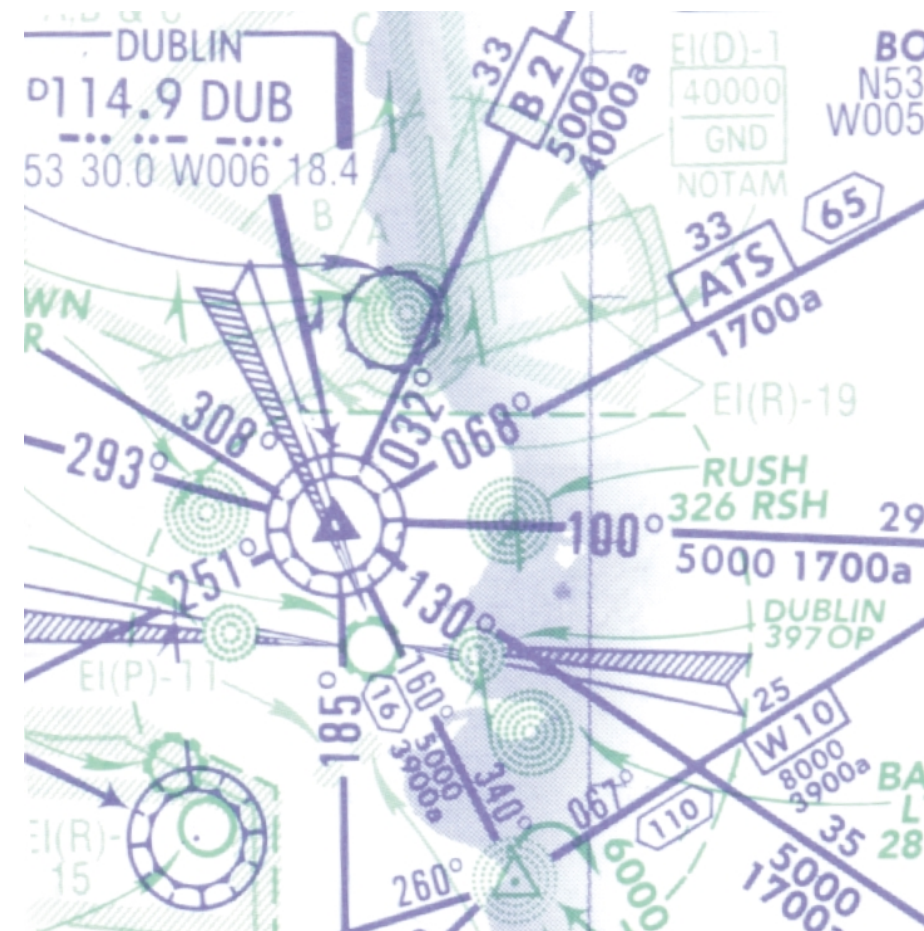


Figure 1: The Dublin VOR showing the airways.

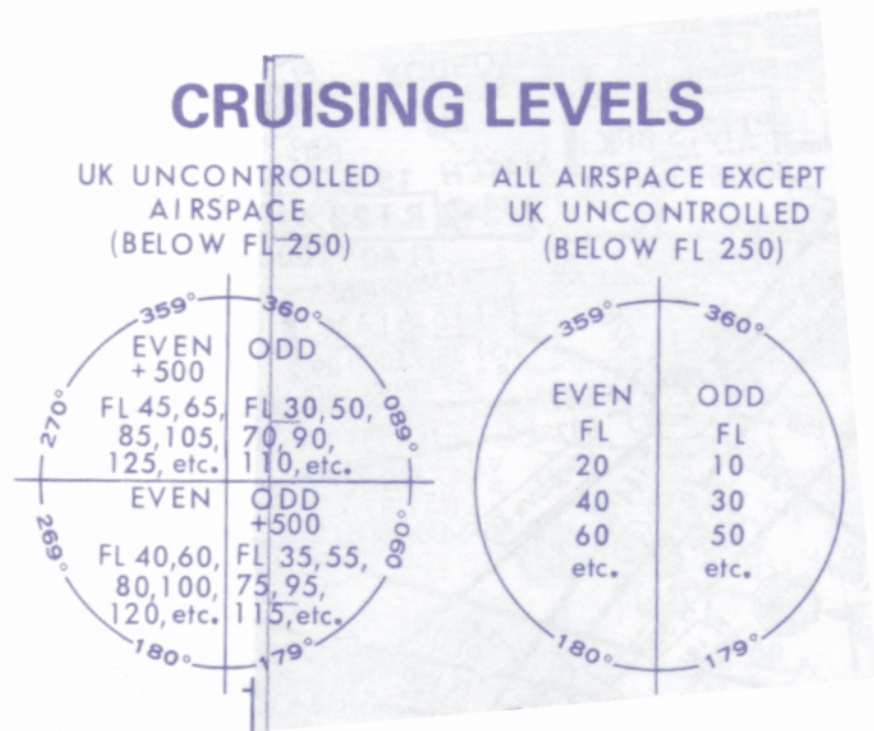


Figure 2: Follow this rule closely or we might meet by accident!

airway B1, from the Dublin VOR, the magnetic track is 100 degrees. This means that if you head across the Irish Sea towards Wallasey (WAL) VOR, near Liverpool, the magnetic course is 100. You will notice that the reciprocal course back to Dublin from the WAL VOR is 279 degrees. The reason it is not 280, i.e. 180 degrees the other way is because the relative position of the earth's magnetic North Pole (unlike True North) differs depending on where you are measuring it from. Also we are looking at a section of the globe of the earth on a flat sheet of paper and the straight lines we see as airways are actually curved lines in reality. We need not dwell on this, but just to make you aware that the earth is not flat!

In the previous issue of PC Pilot, Bill Stack showed us a flight from London City to Stansted. Major airports have Standard Instrument Departures (SIDs) and Standard Arrival Routes (STARs). Our

airways chart shows the information between a SID and STAR, the en-route part of the flight. A SID will usually guide you to a point on an airway and a STAR will guide you from the airway at a particular point towards your destination airport to make an approach.

Along the airway (see Figure 3 below) you will notice a series of numbers, triangles, names and symbols. These aviation hieroglyphics provide the pilot with distances (the numbers above the line) between various intersections/ reporting points (the triangles with names). Each airway will be a certain distance between two VORs and this total distance is contained in a small fat hexagon (also above the airway centreline) in bold print. At each intersection, the latitudinal and longitudinal position are also given.

Below, the airway centreline you will find various altitudes and Flight levels e.g. FL 80

2500. This is an indication of the MEA (Minimum En-route Altitude) and MOCA (Minimum Obstacle Clearance Altitude) respectively. The MEA is the lowest altitude the aircraft can fly on the airway and still receive navigation information from the VOR. Various segments of the airway have different MEAs and the boundary of change is depicted on the chart by a tiny line perpendicular to the airway centreline representation. The MOCA, as the name suggests, is the altitude that allows the pilot to maintain 1000 feet terrain clearance along the airway corridor.

The larger numbers dotted around the chart, are Grid Minimum Off Route Altitudes (MORA). They are depicted on the chart as a large first digit indicating 1000 feet values followed by a smaller digit indicating hundred feet amounts. The Grid MORA is the lowest safe altitude the aircraft can fly maintaining a minimum 1000 feet separation from terrain within



Figure 3: Airway B1 and not a service station in sight.

the defined area outside the airway boundaries.

You will have noticed at this stage that we have covered mainly the blue colours on the charts, and you may be asking yourself about all the green stuff! Well VORs are not the only navigational aid represented on the chart, also present are NDBs (Non Directional Beacons). These beacons can be found on airways but in general they are associated with approach aid facilities, i.e. used in conjunction with ILS (Instrument Landing Systems) at the larger airports or as locators for smaller airfields dotted throughout the world. Some are used as holding fixes for aircraft in flight in and around busy airports. Their accuracy is much less than a VOR and their effective range is around 25 nautical miles. The names of NDBs associated with airways are in a box, like VORs, but all others will only have the name and frequency beside its geographical location.

Civil airports are also represented in green and resemble small cogwheels; military air bases are represented by a small green

circle. The name of the airport will be beside it, space permitting, and its height above sea level. At the larger civil airports there is a larger dashed shape (usually a circle) around the cogwheel; this indicates the local busy airspace boundary associated with the airport. The boundaries around military bases can be huge, as contained within them are danger areas associated with weapons testing. Wales is a classic example of such a danger area as almost half of it is covered by a green boundary. These danger areas have posted their times of operation and from what altitude they are active on the chart. For the civil pilot these can mean large diversions around airspace just to get to their destination. No it doesn't mean we are lost! Again, this information can be cluttered, but be patient - it's usually staring you in the face.

All airports that have an ILS (Instrument Landing System) will have a symbol resembling an arrow feather located on the chart. Although it will not give the details of the ILS it will let the pilot know roughly how many runways have the system

available at the airport and their approximate runway orientation.

Air Traffic Control frequencies are located in blue and green boxes scattered throughout the chart. They usually show the frequencies covering an area of airspace, in preferential order. Outside the box are the altitude restrictions to which these frequencies apply. Other boxes will give details of airspace restrictions and times/days of use. These boxes have a letter annotation so that if you are lucky enough to find where the letter applies, you can figure out what part of the airspace it affects.

So there you have it. You now have the basics to plan a flight just like a real airline captain. We hope this brief explanation will help you get a lot more enjoyment from your virtual flying. Remember, that despite the cluttered looked of the charts, they are a mine of information. Becoming familiar with them will make it easy. Enjoy!

Paul Hannity

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All you need after a hard day's night. Bringing your Hornet back in one piece ain't easy, but is immensely gratifying when you catch that three wire



Call the Ball

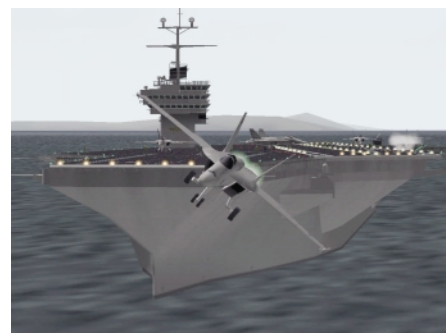
F/A-18E Super Hornet

Top Gun may have been the US Navy's highest profile recruitment aid of recent years, but now it's the turn of Digital Integration to take over from Tom Cruise and issue the call to arms. F/A-18E Super Hornet is currently deployed on a tour of duty at air shows and other public events to give people a feel for the high life. If it's good enough for the USN, then surely it's good enough for the rest of us?

As this is certainly as hard-nosed as any of DI's simulations to date you'll do well to



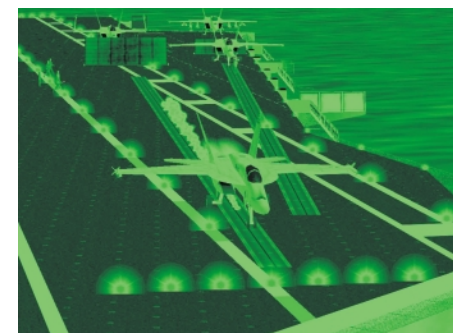
You never get used to the exhilaration of a Cat Shot, but be ready to punch out if things go wrong



dive into the 230-page manual before even thinking about firing up the two monstrous F414 engines. This is a treasure trove of information - from the basics, right through to advanced topics such as how the different radar modes operate. While the F/A-18E/F has a lower pilot workload than previous incarnations, its advanced cockpit systems still take a few hours to master. Thoughtfully, the manual does include a short tutorial section for

novices that will get you up and flying reasonably quickly.

Flying from a conventional airfield is relatively straightforward given the fully interactive cockpit panel. In standard high-resolution mode you can intuitively pan around the cockpit using the joystick hat switch or a mouse. The Super Hornet has a remarkably advanced avionics suite, using some 30 computers in all (see the 'Pilot or Programmer?' box for more details). Land-based missions require you



enough to lift it into the air with little effort.

Taking to sea after some land exercises is a whole new experience. Even with 44,000 pounds of thrust behind it, the F/A-18E/F still needs a little help from its friends to break free of the carrier deck. Suddenly you are transported to a living, breathing ecosystem with hordes of little men scurrying around. For training missions the Air Boss wisely gives you a wide berth, with plenty of deck crew to help out. Aircraft handlers, dressed all in yellow, direct you around the deck with their twirling arm signals. For the faint-hearted you can bypass the start-up procedures by just hitting CTRL-C, and once you are given clearance to turn up your engines, a swift tap on SHIFT-C and you're up, up and away.

The punchy performance of the Super Hornet is enough to lift it into the air with little effort.



to go through the full start-up procedure. APUs (auxiliary power units) need to be turned on before the big burners can be cranked up and the rest of the checklist completed. Luckily the punchy performance of the Super Hornet is

Once you've recovered from the exhilarating cat-shot it's then down to business. The Super Hornet is a true multi-role fighter, making for a wide variety of missions. For air superiority the latest fire-and-forget Sidewinder and AMRAAM missiles supplement the cannon to make short work of enemy planes. To help in dogfighting, DI's padlock view works wonders. With your eyes locked on target, a letterbox display at the top of the screen gives you situational awareness info and an artificial horizon as reference. These not only show you which way you are looking, but also where your plane is pointing. This makes the padlock view the most intuitive around, and is guaranteed to save your skin.



Welcome to the Hornet's nest, ready to project its power at a moment's notice



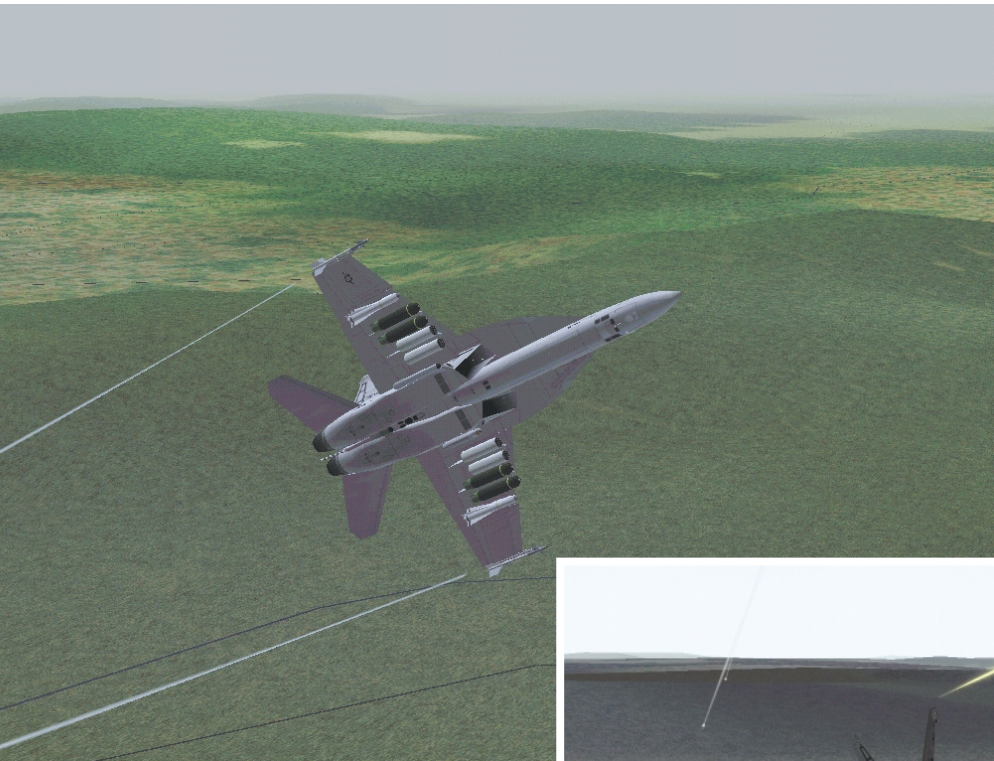
Yee-Ha! Tom Cruise eat your heart out

POTTED HISTORY OF THE HORNET

The Super Hornet may seem like a stunning new aircraft for the 21st Century, but its pedigree goes back almost three decades. The Lightweight Fighter concept was originally put forward in 1968, in light of the then ongoing Vietnam conflict and the 1967 Arab-Israeli war. A Pentagon report highlighted the under-performance of radar-guided missiles in combat, compared to the cheap Sidewinder infrared weapons. In 1972 contracts were signed for the development and fly-off between the General Dynamics YF-16 and Northrop YF-17. The YF-16 became the Air Force's choice to complement the advanced F-15 Eagle, but the US Navy preferred the twin-engine YF-17 for potential deployment on carriers as a combined fighter/attack aircraft.

The original YF-17 had a gross take-off weight of 23,000 lbs and no radar missile capability. In 1975 the Navy redesignated the YF-17 the F-18, and a separate attack version, the A-18, was to be developed too. Originally five different versions were to be built, but these were soon rationalised into the F/A-18A/B single and dual-seat versions. The insistence on all-weather radar capability led to major design changes, with the Hornet more than doubling in weight and becoming far less of a lightweight fighter.

From 1986 the Hornet received avionics and flight instrumentation upgrades, including night-attack capabilities, and were designated F/A-18C/D. Looking towards replacing the ageing Grumman A-6 Intruder long-range strike aircraft, the US Navy considered many options. These ranged from the F/A-14D 'Bombrat', the cancelled A-12 Avenger and the F-117N 'Seahawk' stealth fighter. In August 1993 the Pentagon performed a 'bottom up' review of tactical aircraft requirements, and the F/A-18E/F was chosen as the new deep strike fighter for the Navy. The Super Hornet is some 25% larger than the Hornet, has a much longer range than its predecessor and now has a monstrous eleven weapons stations. The Navy intends to purchase over 500 of these aircraft to become operational in 2001. Enemies beware; the Super Hornet has a bigger sting than ever before.



The scenery can look sparse, but it keeps the frame rate high

For mud-moving the F/A-18E/F can carry every piece of devilry in the Navy’s inventory, from dumb iron to the latest GPS guided stand off attack weapons. Pulling up the lookdown displays allows you to designate and even guide missiles to target. However, this can have a dramatic effect on frame rate, which is otherwise very good. However, most weapons are aimed using the HUD (Heads-Up Display) so this isn’t too much of a problem.

Don't expect to get it right first time.

While the F/A-18 isn’t quite as lightweight as its forefather (see the ‘Potted History’ box), it still has some wondrous handling characteristics. Optimised for manoeuvrability at low-speed and high angles-of-attack, the Hornet can certainly match the MIG-29 and SU-27 point for point. Not only that, but DI’s flight model captures the entire flight envelope,



The office has all mod cons, all mouse-driven of course



including asymmetric engine effects, flat spins, dynamic stalls and even Cobra-type manoeuvres. It really is a joy to fly, and feels spot on across the flight regime.

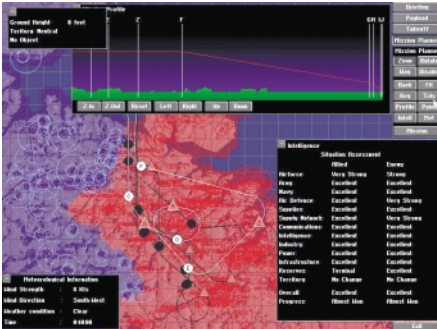
Of course, gallivanting up in the air is fun, but fuel doesn’t last forever. Bringing your plane back home after a tough mission is hard enough on land, but out at sea it’s a whole new ball game. Thankfully, the US Navy tries to make it as easy as possible for its employees, with the FLOLS (Fresnel Lens Optical Landing System) to give you glideslope information and a LSO (Landing Signal Officer) to talk you down every inch of the way. Failing that, there is also an automatic carrier landing facility included, so you can see how it is supposed to be done.



DI's padlock view is simply the most intuitive around

The real challenge comes when trying to bring your steed home manually. Radioing ahead to get vectors to the mother ship and booking your place in the landing pattern is the first step, before lining up for the approach. When within visual range the LSO will ask you to ‘Call the Ball’ and wave you off if your approach is already going pear-shaped. From now on it’s a matter of reading the FLOLS lights and listening to the LSO’s instructions. Passing over the carrier deck for the first time is a real thrill, in anticipation of whether you’ll catch an arrestor wire or be a ‘Bolter’ and go around again. Don’t expect to get it right first time, but you’ll certainly feel a thrill when you manage your first carrier landing - a milestone in any pilot’s career.

Once you’re comfortable with the Super Hornet’s nuances, you can jump into quick combat mode or slug it out in one of two campaigns. There’s a choice of taming the Barents Sea around Murmansk or helping to repel an invasion of Sri Lanka in the Indian Ocean. Each combat area covers around 40,000 square miles and features rolling hills to thunder down once you’ve gone ‘Feet Dry’. To keep frame rates up, the landscape graphics are less than stellar. The terrain has a murky feel to it, although the use of micro-textures makes the ground whizz by at a rate of knots in a convincing manner. Ground objects themselves are



Mission briefings are comprehensive, but there are only 40 to choose from



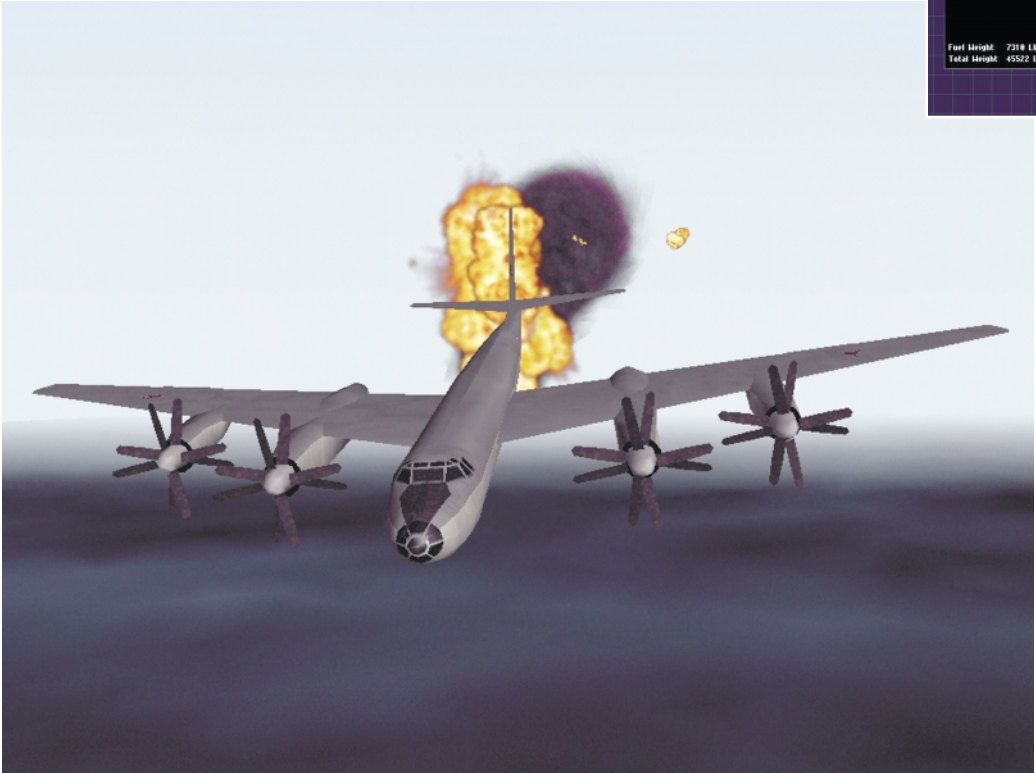
The Virtual Cockpit looks neat, but is rather limited in its usefulness

PILOT OR PROGRAMMER?

The advent of the glass cockpit supposedly makes flying easier, if you’re a born hacker that is. The UFCP (Up-Front Control Display) and two DDIs (Digital Display Indicators) dominate the panel, and are your main instruments. The UFCP is a touch-sensitive panel with a context-sensitive menu system. Clicking on the buttons with the mouse allows you to set-up the autopilot, radio and communicate with your wingmen. The DDIs are used for radar displays, aircraft systems information and a host of other tasks. Coupled with a typical HUD (Heads-Up Display), this gives you everything you need in one view.

Scrolling is only necessary to check the MCPD (Multi Purpose Colour Display) below, flanked by the Integrated IFE (Fuel/Engine) Display and conventional backup gauges. The MCPD includes a moving-map display and navigation information. While this sounds worse than piloting the Space Shuttle, these modern display systems actually combine to make the pilot’s job relatively easy. Extra features such as instructions for spin recovery and checklists are a real bonus too. The downside with the mouse-driven active cockpit panels is that they are awkward in combat, so a good HOTAS (Hands on Throttle and Stick) joystick/throttle set-up is advisable.

detailed nicely though, as are other aircraft. One area that is again rather basic is the audio. Maybe it’s supposed to sound tame, but the engine lacks a certain roar that you’d expect when kicking in the afterburners.



Bear Hunting US Navy style!



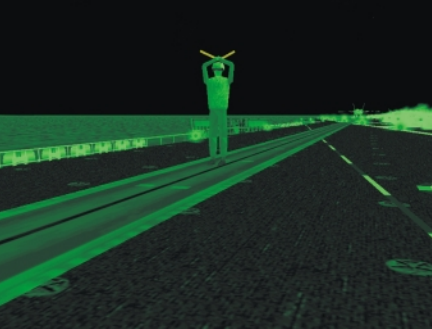
High Alpha manoeuvrability is spot-on, although not recommended this close to the ground



Ground-attack can be hairy, but rewarding



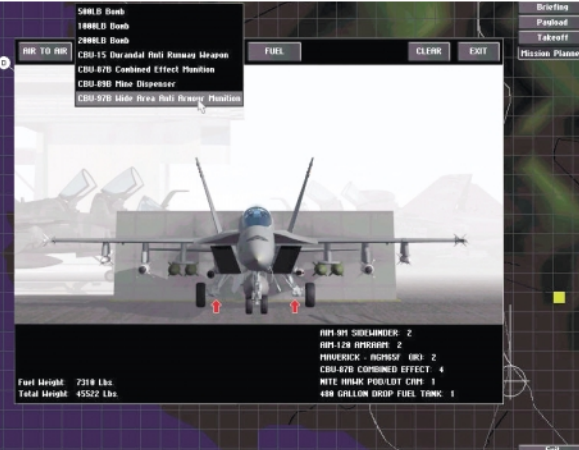
The Super Hornet is master of all trades, giving the Carrier Commander plenty of options



Keep an eye on the deck officers, as traffic is heavy on deck

Reasonable radio traffic abounds; functional but not hugely absorbing.


F/A-18E Super Hornet does many things very well indeed. DI has proved that it can still produce unerringly realistic simulations in terms of flight and avionics systems modelling. The rather simplistic terrain engine and



With eleven pylons, this baby can carry everything you could ever need

audio let it down, however, and the inclusion of only static missions without a mission editor means that this is ultimately a limited experience. We’ll have to wait for the dynamic campaign sequel/add-on to see how and if DI can beat Jane’s F-18 in this dogfight.

Kenji Takeda

REVIEW SCORE:			
Publisher:	Titus	Price:	£34.99
Website:	www.superhornet.com	Release Date:	
Developer:	Digital Integration		Out Now
Pros: Unsurpassed carrier operations. Silky smooth flight model with convincing high alpha characteristics. Nice feeling of speed over the deck.		Cons: Only forty missions. Scenery detail is basic with murky green-grey tinge. Heavy on avionics systems control.	
System Requirements: Pentium 233, 32Mb RAM			
Recommended: PII 400, 128Mb RAM, 3D graphics card			

Jane's USAF

Light up those burners!



The almost indestructible A-10 fires its awesome cannon, seen here over Germany

The majority of jet fighter simulators currently available depict a single aircraft, or variants of the same type, and generally provide comprehensive coverage of a particular airframe so that software writers can concentrate on just one flight model. However, when a developer takes on the task of simulating eight modern fighter aircraft, with all the complexities involved, you begin to wonder whether they might have bitten off more than they can chew. Might we expect to see a watered down simulation, using common routines for each aircraft, underlying a thinly disguised range of cockpits and 3D models?

Happily this is not the case, as Electronic Arts, the company behind Jane's USAF, has been producing accomplished flight simulators for many years and are probably one of the few that could pull off such a feat. The 'Jane's' label has become a byword for quality and immediately elevates this software from mere game status to that of a genuine simulator.

Jane's USAF brings together a formidable collection of aircraft, from heavyweight ground attack machines, through the lighter and faster fighters, to those that wear a stealth cloak and slip through the night totally unobserved by all except the Serbian ground forces! So, in no particular

order, there is the F-105 Thunderchief, F4-E Phantom 2, F-16C Fighting Falcon, F-15C Eagle, F-15E Eagle, A-10A Thunderbolt II, F-117A Nighthawk and finally, coming right up to date with the awesome Lockheed/Boeing F-22A Raptor, which is still under development prior to entering service. For a flavour of the opposing forces, the authors have included the Mikoyan MiG-29 Fulcrum. This caused quite a stir when it was first seen in the West and looks similar to the American F-15 Eagle.

The line up of adversaries doing their utmost to shoot you down, is equally impressive and consists of the MiG-21, MiG-23, SU-22, SU-27, C-130H and KC-135R, all modelled with the same attention to detail.

WHAT'S ON OFFER?

The loading sequence has the mandatory cut scene video clips, depicting many of the aircraft you'll find in the program attacking a range of targets. A quick tap on the space bar takes you straight to the main menu where the choices on offer are to jump straight into the cockpit for some instant gratification, check out one of the training flights, accept a single mission or begin a campaign. With the campaign option you have the choice of re-enacting Desert Storm or Vietnam, providing up to ten different



Welcome to Mission control, where everything you need is at your fingertips



Here we see the A-10 on the downwind leg as it returns to Nellis AFB after a training sortie

missions taken from actual incidents. Alternatively, you can select from two future campaigns called Red Arrow and Sleeping Giant that hopefully will never happen. If you've installed the realistic gameplay option we recommend a few training sorties before you take on anyone who might shoot back. Otherwise, you may find your career span is measured in minutes rather than months - you wouldn't expect to drive a milk float without some sort of tuition, let alone a multi-million dollar jet fighter!



One of the training missions involves air-to-air refuelling, this is not easy but you get quite a sense of achievement after a successful connection



This boom is what you're aiming for. Unfortunately it doesn't stand still while you sort out your port from your starboard and tends to move at different speeds as well

A flight of F-15 Eagles makes a low-level pass along a rocky ridge

Other options within the main menu include the superb reference module that's become a trademark of every simulator bearing the 'Jane's' name. This allows you to view an enormous amount of text-data relating to the aircraft, ground forces and weaponry you'll encounter inside the simulation. The information is supplemented with high-resolution photographs of each object, together with 3D models that can be rotated using the

The F-15 Eagles make their way to the action flying low-level. Notice the changing arid landscape

arrow keys. The main menu is where the game preferences are set, likewise the pilot records, mission recorder and where you can access Jane's on-line gaming service. It also allows you to select the speech recognition option that we believe has not been included before on a flight simulator. This uses a microphone to issue instructions to your aircraft, but sadly we found that long delays before a command was recognised rendered the system totally

HOW ABOUT JOINING THE THUNDERBIRDS?

If you want to try something different, Electronic Arts has already released an add-on for USAF that is freely downloadable from their web site. It contains a model of an F-16 in the colours of the famous USAF Thunderbirds aerobatics team, together with three different display procedures you have to execute in front of the home crowd. Perhaps this is a taste of things to come!



You streak in at low level to start your display



Across the crowd at treetop height



Las Vegas in the distance as you make your first pass



Pull up into a roll over the runway with smoke turned on

unusable and because of editorial constraints we were unable to test it on another system.

Before we slam open the throttle, a word about the documentation. The manual, like the product itself, is a weighty affair and with over 260 pages it covers every



Here we see the MIG-29 waiting at the hold for permission to enter the active runway. You have the option of starting your missions in the air if you prefer

facet of the simulator. Naturally, the instrumentation and weapons systems take up a fair portion, but it's comforting to see the authors assume nothing and explain each subject with the same degree of detail. Starting with the primary flight controls, their basic effects and operating parameters are covered, followed by more advanced manoeuvres, navigation, in-flight refuelling and every pilot's nightmare, stalls and spins. There is more in-depth coverage of the missions and their objectives, as well as the specifications of the flyable aircraft included in the simulator.

LET'S GET THIS SHOW ON THE ROAD

As you sit on the runway before your first training flight, a quick look around the cockpit gives the impression that this is



An F-105 crosses the Rhine over Germany. This aircraft may be old but it still packs a punch



Notice how the atmospheric haze realistically blends the Vietnamese countryside with the sky as we look into the distance... That large grey lump in the foreground is an F-15C



Although it's rather long in the tooth, the F-4E Phantom still has that angry look about it. (It's also one of our all time favourites). Sadly now with very few examples still flying in western air forces



The Iran-Iraq border is clearly marked with red banners. Be aware that you are not allowed to cross

ALSO CONSIDER

Software Title:

Flanker 2.0

Publisher:

Mindscape

Website:

www.ssiionline.com

Price:

£34.99

PC Pilot Rating:

★★★★★

Software Title:

Falcon 4

Publisher:

Microprose

Website:

www.microprose.com

Price:

£34.99

PC Pilot Rating:

★★★★★



Here we see the F-22 Raptor flying at high level over the Iraqi desert. The use of the correct colour palette throughout the program adds to the realism

missions, designed to test your progress through training.

Whatever the phase of your flight, you'll have contact with a controller, constantly updating you with the position of enemy forces as well as relevant information he receives from the AWACS and other intelligence agencies. This is presented by voice and scrolling text across the top of the HUD (Heads-Up Display). Alternatively, the tactical screen, accessed from the [Esc] key, will give you a map showing an overview of the current situation. It also allows you to jump between individual aircraft within your own forces, or those of your opponents, although in the latter case you have no physical control over the aircraft and are simply an observer. Other objects present in the tactical display can be viewed within the same way. Simply double-clicking on a target will bring up a three dimensional scene, focused on the selected object, that you can scroll around in real time using the arrow keys.

THE PLEASURES OF FLIGHT

Once you're airborne the whole thing comes to life. The scenery rolls by smoothly



As these screen shots show, every cockpit is depicted with high quality graphics

and all the aircraft have realistic inertia and flight characteristics that many programs fail to capture. Of course, the initial settings you define in the preferences menu dictate just how realistic your flight experience will be. You can have an aircraft that will react very much like the real thing, or an indestructible projectile that has the flight characteristics of a ten ton truck.

Inside the cockpit things can get decidedly hectic, with the pilot having to navigate the aircraft, manage the electro/mechanical systems, fly the aircraft and challenge any potential threats. Luckily there are instruments and MFDs (Multi Function Displays) available to handle most of these tasks. Older aircraft with less capability

systems, tactical uses and methods of delivery.

The primary locations covered by the simulator are the training area in Nevada, a more densely populated area of Germany, the deserts of Iraq and the lush forests of Vietnam. These are all depicted with superb graphics and simply flying around can be rewarding enough in itself. You have lots of external views to choose from, including chase view, fly-by view, target and weapon views.

SUMMARY

It is very easy to become blasé when reviewing products like USAF. You can easily forget the enormous amount of



The F-117A highlights the superb attention to detail in each of these aircraft



Our F-16 returns home flying into a beautiful Vietnamese sunset - the fields and rivers show a very different landscape to the deserts of Iraq

instrumentation of the aircraft, the overall effect is a well-balanced simulator offering more variety than most.

The purist who requires every switch and button to be represented in the cockpit will be less impressed, but if you can live with that constraint it comes highly recommended.

Joe Lavery



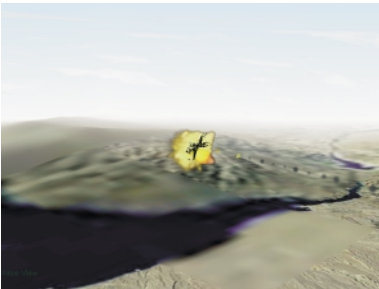
If you want to dodge the SAMs you need to be invisible to radar, this is the best way fly at very low altitude



The F4E Phantom taxis from her hanger on a training mission at the Nellis AFB



Your missiles drop realistically from the wing before they ignite and streak off into the distance



A bit drastic using live ammo on those unfortunate target aircraft. That ball of fire in the middle used to be an A-10 before our sidewinder caught up with it

require more input than the newer ones and this applies equally to the weapons systems.

Of all the features found in modern combat flight simulators, the weapons and defence systems are probably the most important. Mastery of these will allow you to quickly engage your enemies and consequently have more chance of completing your missions. It's well worth reading the chapters that detail the different types of weapons, their targeting

research, graphic design and complex coding that goes into creating such a program. When you consider that the manual is effectively a book documenting the weapons and mechanical systems for eight hi-tech aircraft, each with its own handling characteristics and individual flight models, you begin to get some idea of the enormity of such a task. However, Electronic Arts has certainly risen to the challenge and although the authors have taken a degree of licence with the

REVIEW SCORE: ★★★★★

Publisher:

Electronic Arts

Website:

www.ea.com

Developer:

Janes

Price:

£39.99

Release Date:

Out Now

Pros:

Has a wider scope than most of the current simulators on offer.

Cons:

Needs some serious hardware to get the best from it.

System Requirements:

Pentium 200 MMX, 64 Mb RAM, 4 MB 'Direct 3D' graphics card

Recommended:

Pentium II 350, 16 Mb graphics card

Austria Professional

The hills are alive!

Sometimes it seems that there are almost as many scenery enhancements – both commercial and freeware - for Microsoft Flight Simulator as there are simulation pilots! Each new set of scenery seems to outdo previous versions.

Now as the Flight Simulator 98 era draws to a close, Papa Tango and development team Flight Professionals have launched their very highly detailed Austria Professional scenery.

The package includes a three-ring binder, holding 150-pages of airfield directories and a further 66-pages of Aerad instrument procedure charts, visual approaches and ILS approaches, plus airfield maps for the main airports. Vienna Schwechat charts include detail down to numbered parking stands on the main and GA (general aviation) ramps. It's a pity that this otherwise excellent collection of documents is spoilt by the poor translation into English of a number of the airfield details.

Our Austrian simulation experience started badly. The Austria Professional manual states "Place the CD into the CD-ROM drive of your computer. The Installation program should start automatically" - it doesn't. Examination of the CD shows no 'autorun.inf' file, which would account for this.

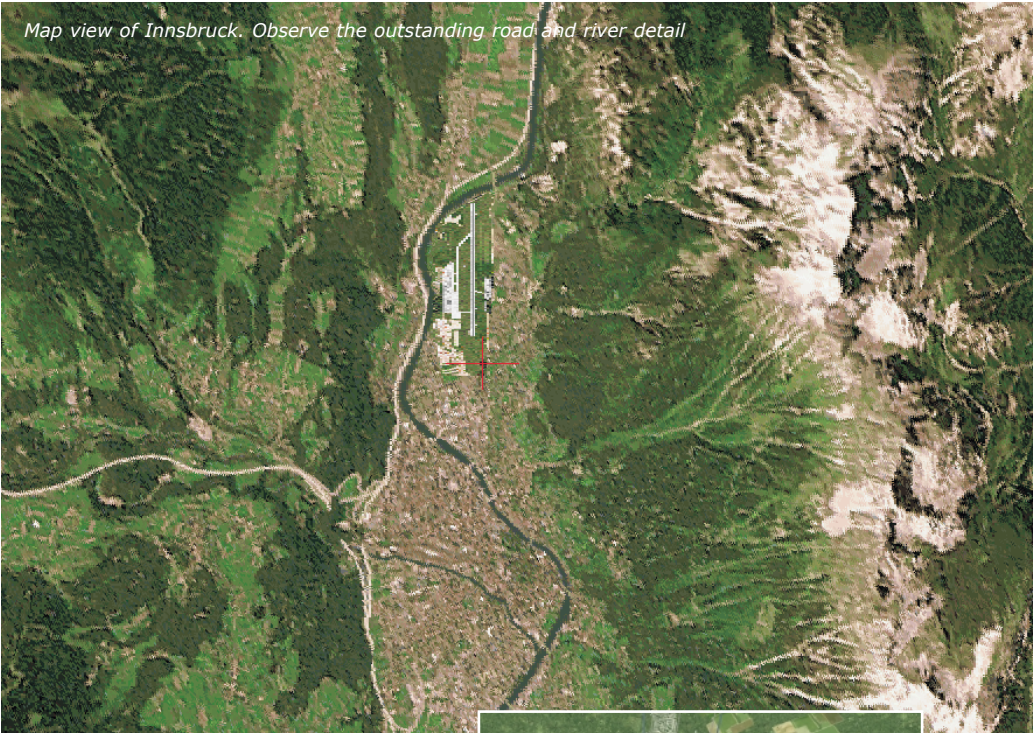


On final approach to Innsbruck runway 26

At least the manual does state that if the program doesn't start automatically, the user should run the 'setup.exe' file on the CD-ROM. Double-clicking on this, things proceed more smoothly and the install program runs, asking for the 23-digit CD



Innsbruck in Flight Simulator 2000...



ID key (eat your heart out Microsoft!) and where you want the program to be installed. When installation was complete, we ran Flight Simulator 98 and had to manually add the scenery (through the World/Scenery Library/Files/Add menus) before the Austria Professional scenery was accessible.

We were delighted to find relatively unknown mountains and landscapes rendered in superb and recognisable detail.

To select any of the Austria Professional airfields it is necessary to choose the 'Scenery from 6.0 and before' menu and click on Austria Professional. Any of the Austrian airfields, complete with four-letter ICAO (International Civil Aviation Organisation) designation, are then selectable. Built-in 'Situations' are included, as are two Pilatus PC6B Turbo-Porter aircraft.



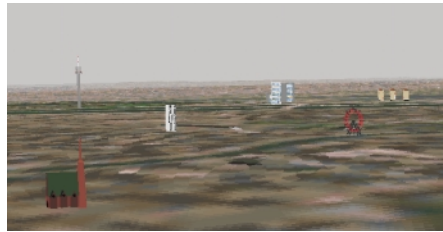
... and with Austria Pro and Flight Simulator 98



Same view, but this time depicted in Flight Simulator 2000. Spot the difference?

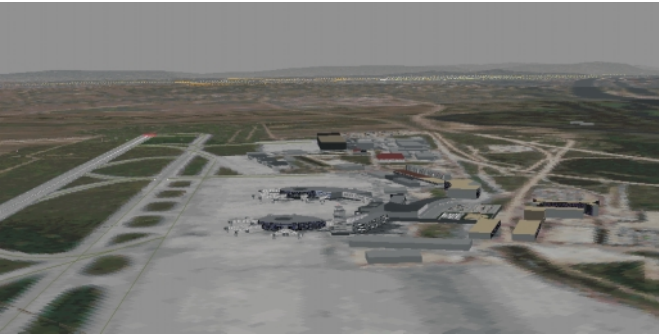
All 55 Austrian airports, airfields and grass strips are provided along with Altenrhein and Samedan in neighbouring Switzerland. This compares with the three Austrian airports that come with Flight Simulator 98, or the 15 airfields provided with the new Flight Simulator 2000.

Choosing one of the airfields, the first thing that registers is the outstanding texture of the local surroundings.



Vienna's city sights - not many! St Stephen's cathedral is in the foreground

Mountains and hills look real; fir-tree forests running up to the tree-line are the right shade of fir-tree green, mountains above the tree line have granite shades of



Vienna's Schwechat airport at dusk

grey that change to snow on the peaks. Alpine meadows look like meadows. The whole thing is impressively authentic.

Austria Professional is unquestionably one of the most striking scenery packages we have ever used.

Airports are well depicted and suitably detailed, with plenty of custom 3D objects like terminals, hangars, and the usual airfield building clutter. Vienna Schwechat is particularly well rendered and sports

Schwechat's distinctive and sexily curved aircraft bays.

The main regional airports, Salzburg, Innsbruck, Klagenfurt, Linz and Graz are similarly detailed. Anyone who flies into them regularly would recognise them straight away. Minor strips may have only one large building, but with many small airfields this is reality.

We were delighted to find relatively unknown mountains and landscapes

rendered in superb and recognisable detail. While even Flight Simulator 2000's roads and rivers go straight up and down mountains at impossible angles, Austria Professional's roads and rivers meander realistically, following the mountain contours.

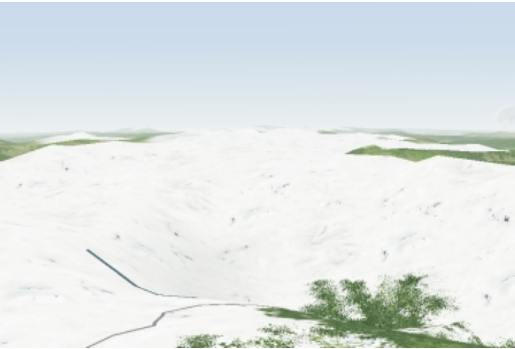
City scenery is sparse though. Vienna's Giant Ferris Wheel, St Stefan's Cathedral and a few other buildings are there but look very lonely! Salzburg's castle is depicted, but not much else - a bit disappointing. However, mandatory airfield visual reporting points are all depicted in their exact locations.



Flying the Pilatus PC6B along the Pastenzen glacier



Austrian Air Force Pilatus PC6B Turbo-Porter with the Grossglockner Mountain left background



The same scene as depicted in Flight Simulator 2000. Note the lack of detail

recognisable, as is the nearby Pastenzen glacier!

Undoubtedly the best way to use this scenery is to fly VFR (Visual Flight Rules), but instead of using your aeronautical chart, use a road atlas - you'll be pleasantly surprised at the detail!

Finally, installing into Combat Flight Simulator is easy and duplicates the Flight Simulator 98 routine. Mind you, the modern Vienna Schwechat didn't exist in the 1940's, so taking off in your FW 190 from there to intercept the US 8th Airforce is a little unreal!

Though not yet available for Flight Simulator 2000, Austria Professional is unquestionably one of the most striking scenery packages we have ever used. For sheer visual accuracy it beats Europe I and both Flight Simulator 98 and 2000 scenery into a cocked hat. If ever there was a case for keeping Flight Simulator 98 on your computer, Austria Professional would be the reason for doing so. ■





Tony Hawes

ALSO CONSIDER	
Software Title:	Europe 1 Pro
Publisher:	Apollo
Website:	www.apollosoft.com
Price:	£34.95
PC Pilot Rating:	★★★★★
Software Title:	Scenery Vienna
Publisher:	Flight Essentials
Website:	www.flightsim.co.uk
Price:	£9.99
PC Pilot Rating:	★★★★★

Flying near the borders of Switzerland and Germany there is a continuous degree of scenery bleed-through from adjacent scenery such as Europe 1. Deselecting this scenery in the World/Scenery menu cures this.

All the relevant Navids seem to be included: VOR's, NDB's, DME's and ATIS transmissions.

We took off from Zell-am-See and climbed south to see how well the Grossglockner at 12,500ft, Austria's highest mountain, is depicted. It is breathtaking and instantly

REVIEW SCORE: 							
Publisher:		Papa Tango		Price:		£29.95	
Website:		www.papatango.com		Release Date:			
Developer:		Flight Professionals				Out Now	
Pros: Accurate and beautiful scenery. Lots of Aerad charts. Two new aircraft. Can also be used with Combat Flight Simulator.				Cons: Not compatible with Flight Simulator 2000. Badly translated airfield information. Relatively expensive.			
System Requirements: Pentium II 300Mhz, 64Mb RAM							
Recommended: 16Mb 3D graphics card, 128Mb RAM							

Pacific Combat Pilot

Banzai!



The Mitsubishi Zero, most feared fighter in the East

In the wake of Abacus' trio of Combat Flight Simulator (CFS) add-ons, The Associates has released Pacific Combat Pilot and are touting it as the ultimate combat experience. Rather than taking individual battles as its focus, the northwest Pacific Islands of Guam, Saipan, Tinian and Rota are all included, together with a generous selection of American, British and Japanese aircraft.

One of the major problems with previous add-ons has been the lack of tight integration of new aircraft and scenarios into the existing CFS menus. Thankfully, here it is possible to simply run the CD installation routine and have immediate access without the need to hack configuration files. Notably, all aircraft are

available not only to fly, but also as adversaries in the Quick Combat menu. The new scenery areas are added to the location menus, so it's no longer necessary to enter Latitude and Longitude coordinates to jump over to the Pacific. There are even Japanese and US carriers included as starting locations. These may seem like trivial niceties, but without this functionality many users have been frustrated and unable to take full advantage of CFS's capabilities with other add-ons.

A reasonable manual provides hints and interesting background on each of the 27 aircraft on offer. Descriptions of the 20 US and Japanese campaign missions are rather brief and all that is included on the

historical front. This is in sharp contrast to the excellent in-depth discussions included in the competing Abacus titles – Battle for Midway, Pacific Theatre and Wings over China.

The campaigns, set in 1944, involve defending the island of Saipan if you take the side of the Japanese, or invading the island if flying with the Allies. Initially the Japanese prefer to use offence as their best defence. Taking out US ships or escorting the bombers is order of the day. Then it's

The island and other scenery is some of the best we've seen for CFS.

time to repel the Allied counter-attack, which ultimately results in an amphibious landing on the island and an ensuing land battle. Most Allied missions are simply the flip-side of these situations, all of which can involve large numbers of adversaries being airborne at once. However, there are a couple of extra missions in other areas, such as rescuing a lone B-29 and attacking Japanese ships shelling the island of Rota. While these fracas create some wonderfully chaotic battle scenes, they can cripple even moderately fast PCs in a flash. A Celeron 300 was just able to keep



The Shinden, canard-wing high-speed interceptor. Advanced, but too little too late



Meticulous detailing, even down to the Japanese gauges

Jeppesen Charts - Glossary

Compiled by Mike Clark



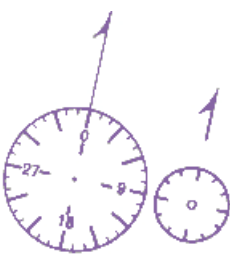
Information kindly supplied by Jeppesen.
© Copyright 2000 Jeppesen (GmbH).

THESE CHARTS ARE NOT TO BE USED FOR REAL WORLD NAVIGATION.

We are sure you have already noticed the Jeppesen low altitude en-route charts, E(LO) 1A, E(LO) 1 and E(LO) 2, included with this issue of PC Pilot. To help you interpret the multitude of symbols used on these and other Jeppesen charts, we present the first of a two-part pullout reference guide. Please also refer to the general Glossary at the back of the magazine for explanation of common acronyms.

NAVAID SYMBOLS

PULLOUT SECTION



VOR (VHF Omni-directional Range) beacon.



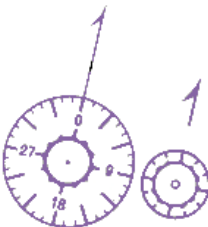
Terminal Class VOR beacon.



TACAN (Tactical Air Navigation) or DME (Distance Measuring Equipment) beacon.



Terminal Class TACAN beacon.



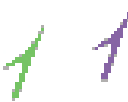
VORTAC/VORDME – a combined VOR and TACAN or DME beacon.



NDB (Non-directional Radio Beacon).



Compass Locator (charted only when providing an en-route function).



Magnetic North ticks on navigational facilities fit compass roses on IFR en-route chart plotters, making it possible to measure the magnetic bearing of any track.



LOC or LDA Front Course.



LOC Back Course.



MLS (Microwave Landing System) Course.

BROADCAST STATIONS



Commercial



Armed Forces Radio Station

NAVAID IDENTIFICATION



Navaid identification is given in a shadow box when the navaid is an airway or route component, with frequency, identifier, and Morse code. A small 'D' preceding the VOR frequency at frequency-paired nav aids indicates DME capability. VOR and VORTAC navaid operational ranges are identified (when known) within the navaid box except on USA and Canadian charts. (T) represents Terminal; (L) represents Low Altitude; and (H) represents High Altitude.



(DME not Co-located)

When VOR and TAC/DME antennas are not co-located, a notation 'DME not Co-located' is shown below the navaid box.



The navaid frequency and identification are located below the location name of the airport when the navaid name, location name, and airport name are the same.



Heavier shadow boxes are gradually replacing existing shadow boxes. There is no difference in meaning.



Off-airway nav aids are unboxed on Low and High/Low charts. The TACAN/DME channel is shown when a VOR navaid has frequency-paired DME capability. When a Low/Medium frequency navaid performs an en-route function, the Morse code of its identification letters are shown. Off-airway VORs are boxed except on USA and Canadian charts.



A round cornered box identifies LOC (Localiser), LDA (landing distance available) and MLS (Microwave Landing System) nav aids when they perform an en-route function. Frequency identification and Morse code are provided. DME is included when the navaid and DME are frequency-paired.



On High/Low altitude en-route charts, geographical coordinates (latitude and longitude) are shown for nav aids forming high or all altitude airways and routes. On Area charts, geographical coordinates are shown when the navaid is an airway or route component. Some Low/Medium frequency nav aids are combined in the shadow box even though they are not part of the airway/route structure, except on USA and Canadian charts. They are used for course guidance over lengthy route segments when an airway or track is designated into a VOR.



When TACAN or DMEs are not frequency-paired with the VOR, the TACAN is identified separately. The 'ghost' VOR frequency, shown in parentheses, enables civilian tuning of DME facility.



Fan marker name and code.



Dial-up Remote Communications Outlet (DRCO)(Canada). Connects pilot with an ATS unit via a commercial telephone line.

RADIO FREQUENCIES

Frequencies for radio communications are included above navaid names, when voice communication is available through the navaid. These frequencies are also shown at other remote locations. Radio Frequencies, which are in the 120 MHz range, are shown with the numbers '12' omitted; 122.2 is shown as 2.2, 122.35 as 2.35, etc. HF and LF frequencies are not abbreviated.



River Radio transmits and receives on 122.6 located at Diamond. The small circle enclosing the dot denotes remote communication site.



Tapeats Radio transmits and receives on 122.2 and 122.4. The telephone symbol indicates additional frequencies in communications panel listed under Tapeats.



HIWAS - Hazardous Inflight Weather Advisory Service. Broadcasts SIGMETS (severe weather warning), AIRMETS (CAA's telephone aviation weather service, covering Southern, Northern and Scottish regions of the UK) and PIREPS (Pilot Reports) continuously over VOR frequency.



River Radio transmits and receives at Phantom on 122.3. Additionally, Phantom Radio transmits and receives on 122.6.



River Radio transmits through Lava VOR on 115.3, but is not capable of receiving transmissions through the VOR site.



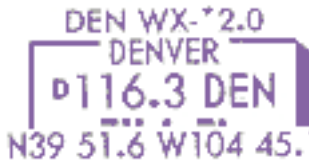
Grand Radio is located at the airport and transmits and receives on 122.2 and 122.6. Additionally, Grand Radio provides LAA (Local Airport Advisory) on 123.6.



Terminal Radio frequencies and service may be included over airport or location name. A radio call is included when different than the airport or location name. Mandatory Frequencies (MF), Aerodrome Traffic Frequencies (ATF) or UNICOM (U) frequencies include contact distance when other than the standard 5 nm.



Call and frequencies of Control Service for use within graphically portrayed Radio Frequency Sector Boundaries.



US 'Enroute Flight Advisory Service'. Identifier of controlling station to call, using (name of station) Flight Watch on 122.0 MHz. They are charted above VORs associated with controlling stations and remote outlets. Service is provided between 0600 and 2200 hours daily.



The telephone symbol indicates additional communications may be found in the communications tabulation after the associated navaid or location name. Telephone symbol does not necessarily mean that voice is available through the navaid.



Plain language in-flight weather station with name and frequency.



Call and frequencies of control or unit service. For use within geographically defined radio boundaries.



Call and frequency of en-route service or control unit. Single Side Band capabilities are available unless specified otherwise.



Remote air/ground antenna for direct communications with control centre. Centre is named in large type and name of remote site is in parentheses below followed by appropriate VHF frequencies.



NAVAID / COMMUNICATION DATA

(May be Shutdown)

(May be Test Only)

(May not be Comsnd)

(R)

Enroute Radar capability. All domestic U.S. centres are radar equipped so (R) is omitted from domestic U.S. centre boxes.



Underline shown below navaid identifier indicates Beat Frequency Oscillator (BFO) required to hear Morse code identifier.

H + 04 & 15(1)

Marine beacon operation times. Transmission begins at 4 minutes past the hour and every 15 minutes thereafter in this illustration; other times will be indicated. Number in parentheses gives duration in minutes of transmission.

FOG:H + 02 & 08

Facility operates in fog only at times indicated.

*

Asterisk indicates navaid operation or service is not continuous.

RESTRICTED AIRSPACE



Restricted Airspace. The accompanying label indicates it is prohibited, restricted, danger, etc. (See RESTRICTED AIRSPACE DESIGNATION).



On some charts prohibited areas are shown by a crosshatch pattern.



Training, Alert, Caution, and Military Operations Areas

CY(R)-4207
FL 450
GND
SR-SS
(MSP ARTCC)

CY(R)-4207 = Country identifier, designation in parentheses, and number
FL 450 = Upper Limit
GND = Lower Limit
SR-SS = Hours active
(MSP ARTCC) = Controlling Agency (limits may be tabulated)

•ED(R)-7
30000
GND

Dot indicates permanent activation on some chart series.

R-6001
24000
GND
(JAX ARTCC)

On USA charts, K (indicating USA) and parentheses around the designating letter are omitted.



When restricted airspace areas overlap, a line is shown on the outer edge of each area through the area of overlap.

RESTRICTED AIRSPACE DESIGNATION

- A - Alert
- C - Caution
- D - Danger
- P - Prohibited
- R - Restricted
- T - Training
- W - Warning
- TRA - Temporary Reserved Airspace
- MOA - Military Operations Area

Canadian Alert Area Suffixes

- (A) Acrobatic
- (H) Hang Gliding
- (P) Parachute Dropping
- (S) Soaring
- (T) Training

AIRPORTS

Civil	Military
Airport	
Seaplane Base	
Heliport	

Andrews Co
3176

Airport not having a Jeppesen Approach Chart.

(AFIS)

AFIS (Aerodrome Flight Information Service).

(ALA)

Authorised Landing Area.

(LAA)

LAA - Local Airport Advisory.

NAME
570

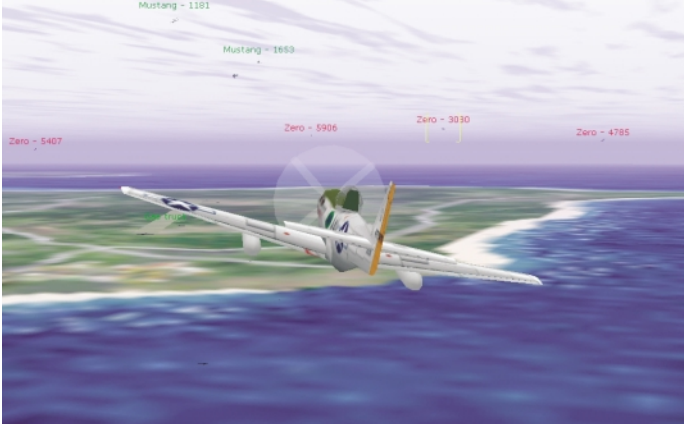
Airport elevations are in feet AMSL (above mean sea level).

RIVERSIDE
CALIF
816

Airport locations labelled in capital letters indicate a Jeppesen Approach Chart is published for that airport and is indexed by that name.

DENVER COLO
Jeffco
8684
CHARLOTTE NC
Douglas
Owens

When the airport name is different, it is shown following the approach chart indexing in small letters. Available terminal communications are provided in the COMMUNICATIONS tabulations. The airport is listed under the name in capital letters - Douglas Mun is listed under CHARLOTTE. When only the airport name is shown, the airport is listed under the airport name - Owens is listed under Owens Apt.

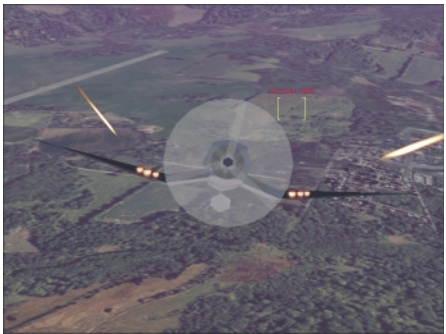


Into the fray, defending the island against swarms of Japanese - slideshow time again!

up with the largest dogfights, lesser machines will croak on around half of the missions. Of course, this is an inherent limitation in CFS itself and not of this add-on per se, but owners of slower PCs beware.

The island and other scenery is some of the best we've seen for CFS. Large mountains and nice photo-realistic beaches effects make it a joy to sightsee if you get the time.

What is particularly nice about this package is that practically every Japanese aircraft in the World War II inventory is here. Notable is the inclusion of four variants of the Zero, from the venerable Type-21 that was the scourge of Pearl Harbour, to the Type-63 Kamikaze special. The Zero is a remarkably manoeuvrable aircraft, rivalling anything the West had on any front. This is reflected in the sprightly flight model, which also feels more refined than those from the Abacus hangar. The more heavyweight contenders from Mitsubishi and Nakajima provide considerable variety, and all sport excellent panel displays, even down to the Japanese gauges. That's right, brush up on your Hiragana and Kanji, or just plain guess at the labelling. Thankfully, numbers are the



The unmistakable gull-wing Corsair, serious firepower



Taking out pillboxes in support of an amphibious assault - Pow!

same the world over so this isn't much of a problem, but certainly adds to the atmosphere. Unfortunately, the same can't be said for the radio chatter. The voices all sound distinctly German and not the least bit Oriental.



Ten missions in for each side - Saipan island is at stake

In addition to the 20 Japanese variants, there are seven Allied aircraft to tinker with. The Grumman F-6F-3 Hellcat and Vought F4U-1A Corsair are instantly recognisable and fly beautifully here. Two P-51Ds and the Spitfire Mark VIII are also available for those craving familiarity. A little more adventurous is the De Havilland twin-engine Mosquito Mark VI, a remarkably agile fighter that packs a serious punch.



The De Havilland Mosquito certainly isn't small fry

All of the aircraft look respectable from the outside, although the texturing is very blocky up close. Some of the components, such as undercarriage wheels look quite chunky, but the animated moving parts do work well. The virtual cockpit and padlock views work better than in other CFS add-ons. On occasion we found the canopy to go solid though, and it is still impossible to use the padlock view to actually put the gun sight bang on target.

Pacific Combat Pilot claims to be the ultimate add-on for CFS. While it lacks the more famous battles at Pearl Harbour and Midway, it certainly has a great selection of aircraft, stunning scenery and a decent collection of missions. For twenty-five pounds it represents good value for money for fighter jocks and is an ideal springboard for mission designers too. ■

Kenji Takeda



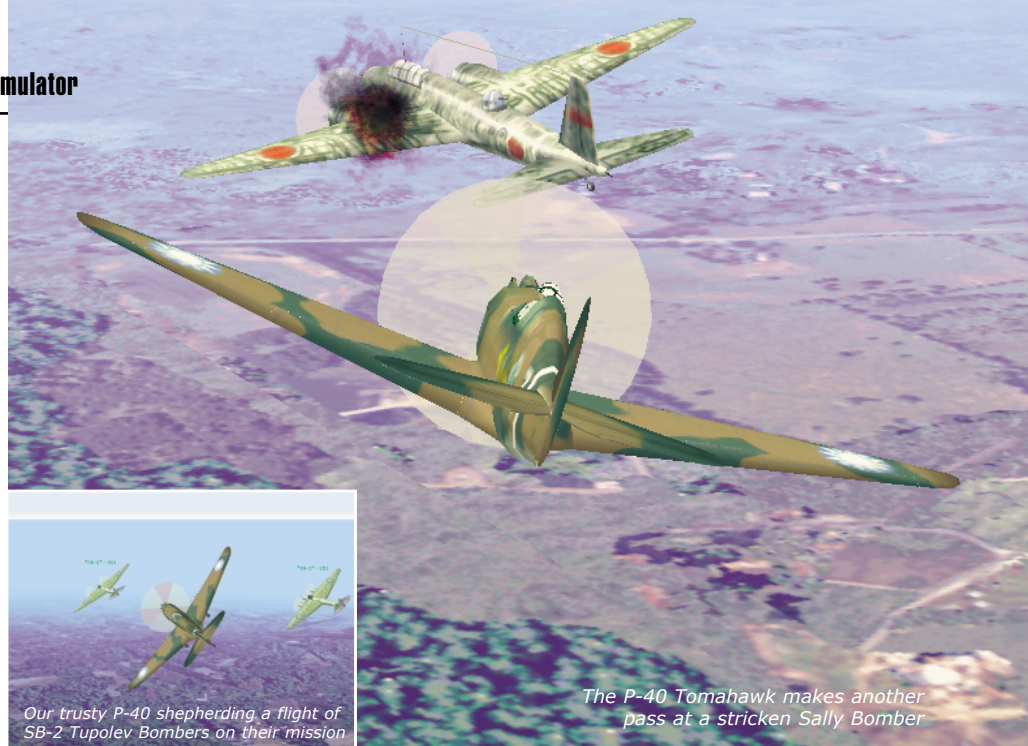
On the offensive. Take out those carriers as soon as possible



Ten missions in for each side - Saipan island is at stake

REVIEW SCORE:			
Publisher:	The Associates	Price:	£24.99
Website:	www.flightsim.co.uk	Release Date:	
Developer:	Blue Arrow		Out Now
Pros: Great aircraft assortment, all detailed well. Picturesque scenery. Comprehensive install routine.		Cons: Blocky textures. Lack of Pearl Harbour or Midway missions. No authentic Japanese radio.	
System Requirements: Pentium 200, 16Mb RAM			
Recommended: Pentium II 400, 128Mb RAM, 3D video card			

Wings Over China



Our trusty P-40 shepherding a flight of SB-2 Tupolev Bombers on their mission

The P-40 Tomahawk makes another pass at a stricken Sally Bomber

Tiger, Tiger Burning Bright

In contrast to Microsoft's Flight Simulator, Combat Simulator has been the poor relation when it comes to expansion packs, with few worthy contenders released to date. However, in an effort to redress the balance, Abacus has released Wings over China. This package is

before it was formally inducted into the US Air Force. In that short time it accumulated the best air combat record in aviation history with eighteen pilots scoring over five kills to become 'Aces'.

Although Wings over China is just an expansion pack, it practically turns Microsoft Combat Flight Simulator into a new experience. There are 12 new aircraft, new scenery areas, new sound files and more importantly, 20 new missions. It's also the first expansion pack to provide users with the opportunity to lead a bomber formation, flying the B-25 Mitchell, or Bristol Blenheim. The action takes place over a scenic recreation of western China and South-East Asia. Designed by Tim Dickens, it manages to capture the fairly barren landscape, particularly around the foothills of the Himalayas, with great skill and attention to detail. There's also a decent collection of new objects dotted around the scenery that help to breathe life into the terrain.



A typical grass airstrip, with a B-25 Mitchell about to start her takeoff run

Unfortunately, the scenery has a few bleed-through problems, particularly near the ground. Having completed one mission and in preference to the easy option of an automated landing, we chose to fly all the way in. At this point the Wings over China landscape appeared to be floating over the default Combat Simulator landscape like a surreal sea into which we slowly sank on landing and promptly crashed, turning what was a successful mission into a failure. On another occasion, jumping from one part of a mission to the next, the aircraft we were flying simply crashed into the one in front. Repeating the mission simply repeated the crash and there seems no possibility of taking evasive action, because immediately the aircraft comes under your control, you crash! The only

THE HARDWARE



solution we found was to get well ahead of the formation before hitting the 'X' key.

Overall, the 20 missions offer a good mix of action, including dogfights against the lighter and more manoeuvrable Nakajima Ki-27B 'Nate'. There are a couple of bomber interception missions against the Mitsubishi Ki-21 'Sally', or Ki-30 'Ann', who will readily customise your aircraft with ventilation holes if you take too long lining up for an attack. Other missions include ground attacks on Japanese supply convoys, using the newly arrived P-40E Kittyhawks and reconnaissance missions against enemy airfields. There's even a ferry run across the Himalayas from Tinsukia airfield in India to deliver a new



The B-25 Mitchell drags herself into the air with a belly full of good luck charms for the Japanese!

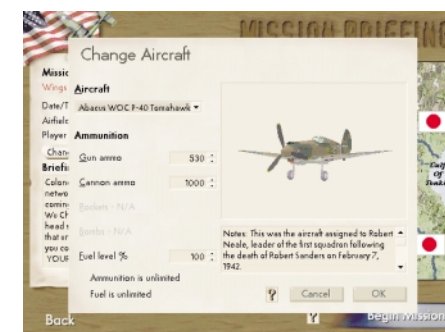
B-25 Mitchell to the Tigers, which we suspect may have been included to show off the superb rendition of the Himalayas, complete with snow capped peaks and misty valleys. However, unlike the original missions in Combat Flight Simulator, Wings over China only provides missions from the American viewpoint. You can obviously fly any of the Japanese aircraft but there are no missions actually dedicated to the opposing forces.

Terry Hill designed each of the twelve new aircraft with the help of the new Abacus 'Aircraft Animator' (reviewed last issue). The results are authentic paint schemes,

fully mobile control surfaces, new flight models as well as neatly animated undercarriage structures with slowly rotating legs that fold correctly (on certain aircraft), fully working ailerons and flaps. The quality becomes even more apparent when you take a walk around these mini works of art – they literally spring to life with the use of a decent 3D graphics card. The fuselage contours are beautifully rounded with not a hint of masking tape anywhere and no joints in evidence.



The briefing screen provides an outline for the current mission and a detailed map showing your intended targets



Choose your weapons... you'll need a bit more than six paces to use this baby

If you take up an external viewpoint on the runway and press 'E', you'll see the propellers slowly spin up in a very realistic manner, one after another on multi-engined types. Another benefit of a 3D graphics card is light sourcing, which makes the aircraft stand out from the background and become more realistic.

The flight models were obviously designed faithfully around the original aircraft. The flight characteristics and inertia feel just right, although without experience of the real aircraft, this is only an opinion. For example, piloting the B-25 Mitchell is like flying through treacle, wallowing and reacting very slowly to control inputs, which is realistic. In contrast, the P-40 Tomahawk is a dream to fly, but is similar to a bad tempered walrus - he doesn't go anywhere very quickly, but you'd be well advised not to get in his way.

Although far from perfect, there are a few areas that need attention, on the whole Wings over China delivers the goods and represents reasonable value for your money if you are a combat fan.

Joe Lavery



You can see one of the strange scenery problems here, where the aircraft is underneath the airfield...



...the aircraft floats between the two scenery levels, over what appears to be a choppy green sea



Each of the new aircraft comes with its own cockpit.



Glad to be home again. Have you noticed the rather natty ventilation holes in the cockpit canopy?

REVIEW SCORE:	
Publisher: Abacus	Price: £24.99
Website: www.abacuspublisher.com	Release Date: Out Now
Developer: Tim Dickens & Terry Hill	
Pros: Gives a new lease of life to Combat Flight Simulator with new missions, aircraft and scenery.	Cons: We found a couple of unexpected scenery anomalies near the ground.
System Requirements: Pentium 200 MMX, 32Mb RAM	
Recommended: P III 450, 64Mb RAM, 16Mb 3D graphics card	

Flight Simulator 2000 Books

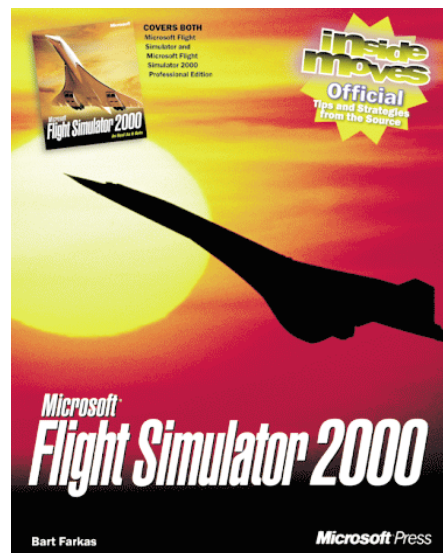
Only six or seven years ago, when programs sold by the thousands, companies took great pride in the quality of documentation that accompanied their products. Then, as programs sold by the hundreds of thousands, or even millions, the expense of providing glossy, informative manuals became something that even the most affluent of computer companies balked at.

Many flight simmers will remember the miserable 'manual' that came with Microsoft Flight Simulator 98: 71-pages long with only five pages of instructions (the rest were maps) and about as useful to a budding simulator pilot as a chocolate teapot. Now users who previously complained of lack of flight simulator documentation are saying complimentary things about the 322-page Pilots Handbook for Microsoft Flight Simulator 2000 Pro and the 238-page handbook for the humble Standard version.

As Microsoft supply an informative handbook with the program, it's hard to believe that there is a demand for additional books about Flight Simulator 2000, but book publishers Microsoft Press and Sybex Inc. think otherwise. Both have just released books catering for Flight Simulator 2000 users. We give our verdicts on both.

Microsoft Press – 324 pages

Written by Bart Farkas, this book is more than a glorified manual, rather an informed and augmented version of the



Microsoft Flight Simulator 2000: Inside Moves — Official Tips and Strategies

Microsoft Flight Simulator 2000 Pilots Handbook and is designed to advance the user's experience of using the product.

Divided into four parts, 'Microsoft Simulator 2000: Inside Moves' consists of 11 chapters and two appendices:

Chapter 1, 'Making it Real' contains information on customising Flight Simulator 2000.

Chapter 2, 'The Aircraft', provides a closer look at each of the aircraft in flight simulator.

Chapter 3, 'Navigational Tools', deals with general navigation; including use of the GPS receiver.

Chapter 4, 'Adventures', gives tips for several of the built-in adventures.

Chapter 5, 'The Air Rally', offers a unique look at air rally support and comes with a practice rally and four new rallies created especially for FS2000.

Chapter 6, 'Emergencies', describes how to deal with the real thing.

Chapter 7, 'Challenging Flights', contains some freshly devised challenging flights.

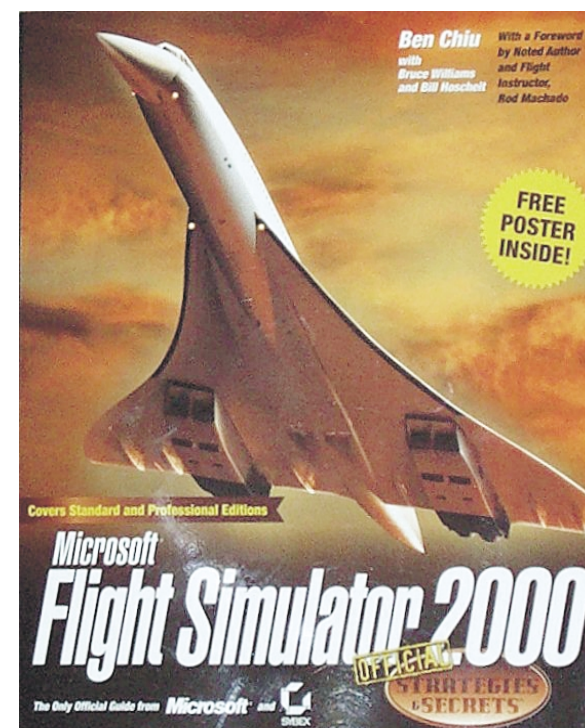
Chapter 8, 'World Highlights', is a guide to historically significant locations.

Chapter 9, 'Flying With Others', provides a guide to the MSN Gaming Zone.

The remaining two chapters are for FS2000 Pro users and cover the Aircraft Editor and advanced flight techniques.

The two appendices cover a host of topics including choice of hardware and how to use 'Online Resources' to get additional help.

Determined to publicise the non-FS games program 'Age of Empires II — The Age of Kings', Microsoft Press have included a complete chapter from the companion 'Age of Kings — Inside Moves' book, which to a dedicated flight simulator user is a complete waste of space.



Microsoft Flight Simulator 2000—Official Strategies and Secrets

Sybex – 372 pages

Published by Sybex. 'Microsoft Flight Simulator 2000 Official Strategies and

Secrets' is written by Ben Chiu with input from Microsoft's Bruce Williams. In layout and style it is comparable to 'Microsoft Simulator 2000 Inside Moves' but is focused principally on FS2000 and the new aircraft.

Divided into ten chapters with six tutorials the authors make the very valid point that when relying on printed media and dealing with complex tasks such as flight operations, tutorials are the best method of introducing pilots to new aircraft, systems and procedures.

Content ranges by way of the essentials for configuring your software and hardware in chapter one, through the elements of simple VFR map navigation, to complex technical theory and flights in a high cockpit workload environment. Sensibly, each new tutorial builds on skills and knowledge acquired from the one before; complete tutorial one and you're well equipped to learn the skills in tutorial two and so on.

Side-by-side

So which of these two books is best? It's hard to choose, the boxed manual and the built-in help file covers most that a newcomer to Flight Simulator 2000 needs to know. Nevertheless, if you are an experienced user, the two books have definite and separate advantages.

Microsoft Press' 324-page 'Microsoft Simulator 2000: Inside Moves' offers first-class advice for getting the best from the supplied FS2000 adventures; it also has a selection of challenging flights that you can set up from the supplied instructions. You also get a handy tear-out keyboard-shortcuts guide, but this is no big deal because the same guide is on the back of the Pilots Handbook that comes with Flight Simulator 2000. However, it does also

come with a comprehensive 17-page index.

Sybex's slightly larger 'Microsoft Flight Simulator 2000—Official Strategies and Secrets' is quite definitely aimed at the advanced user. It's chock full of technical advice and the tutorials contain all the guidance necessary to undertake flights, from relatively simple Cessna 182 trips to 34 pages of instructions on how to successfully pilot Concorde supersonically across the Atlantic. Appendix B contains 74-pages of IFR terminal charts and a tear-out Los Angeles sectional chart, which has on the reverse a high-altitude California en-route chart. It has a comprehensive table of contents, but no index.

Content of both books is in black and white, not a colour page to be seen, apart from the covers and the tear-out map in the Sybex book.

Conclusion

'Microsoft Simulator 2000: Inside Moves' explains the adventures in detail, but most of the content reflects what is already in the supplied FS2000 Pilots Handbook. Mainly because of the depth of technical content and the charts we prefer Sybex's 'Microsoft Flight Simulator 2000—Official Strategies and Secrets'.

Tony Hawes

Both books supplied by Computer Manuals, Telephone: 0121 706 6000. Phone for a free book list or visit their Web page: www.computer-manuals.co.uk

REVIEW

Title:	Microsoft Simulator 2000: Inside Moves		
Writer:	Ben Chiu	Price:	£14.99
Publisher:	Sybex	ISBN	0-7356-0547-5

REVIEW SCORE:	★★★★★			
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Title:	Microsoft Flight Simulator 2000 Official Strategies and Secrets		
Writer:	Bart Farkas	Price:	£14.99
Publisher:	Microsoft Press	ISBN	0-7821-2634-0

REVIEW SCORE:	★★★★★			
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Building Fear & Making Loathing Over The Crimea

Creating Missions In The Flanker 2.0 Mission Editor

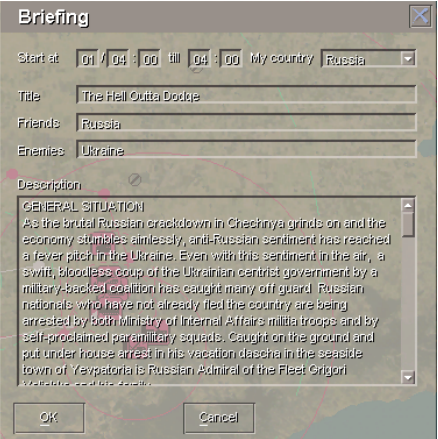


Flanker 2.0 provides one of the best flight models we've seen for a combat simulation. However, its lack of a dynamic ground environment has soured the overall enjoyment. It is true-land and sea units do not and cannot move. However, once you start prying into the Mission Editor, the static ground units trouble you less and less. The AI, both bandit and good guy, is motivated and formidable. The catalogue of stuff you can blow up and that can shoot you down is downright extensive.

If you want to get more than a couple of weeks of fun out of Flanker 2.0 then you will need to learn how to use the Mission Editor (ME). There are only so many canned missions and only one branching campaign, but in using the ME you can stretch out the freshness of the sim indefinitely.

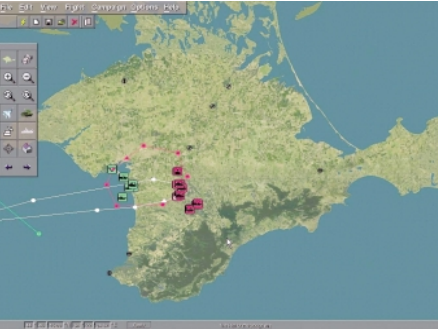
The Scenario... 'The Hell Outta Dodge'

Before doing anything, you'll have to dream up a scenario. Here's the briefing



general situation that we came up with for an example mission:

As the brutal Russian crackdown in Chechnya grinds on and the economy stumbles aimlessly. Anti-Russian sentiment has reached a fever pitch in the Ukraine. Even with this sentiment in the air, a swift, bloodless coup of the Ukrainian centrist government by a military-backed coalition has caught many off guard. Russian nationals who have not already fled the country are being arrested by both Ministry of Internal Affairs militia troops and by self-proclaimed paramilitary squads. Caught on the ground, and put under house arrest in his vacation dacha in the seaside town of Yevpatoria, is Russian Admiral of the Fleet Grigori Velichko and his family.

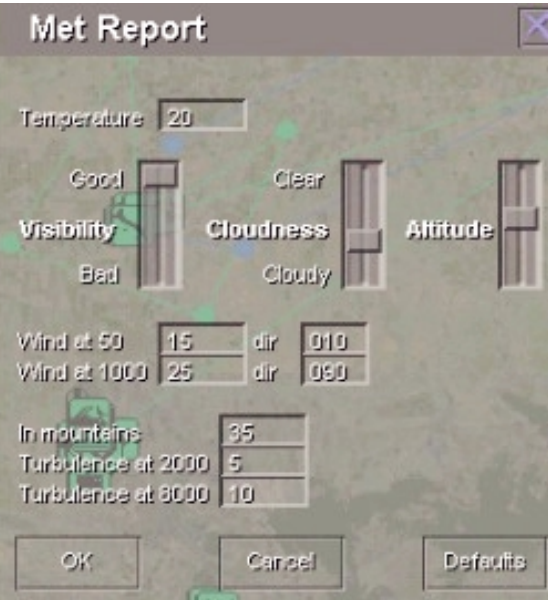


A task force is assembled quickly and quietly to get him out. With Kunetsov carrier group (with AWACS support) offshore supporting a Marine infantry unit that has taken and is holding the airfield at Saki, SPETSNAZ Special Forces enter Yevpatoria to free Velichko and his family. The plan calls for the SPETSNAZ to take down the small guard garrison, and transport Velichko's entourage to a waiting transport at Saki Airport. After the Illyushin is safely out of Ukrainian airspace, the SPETSNAZ will load up with the Marine infantry unit on the waiting landing craft and retreat to the open sea - under the protective cover of the Kunetsov if necessary. Things seldom go as planned, however, and the SPETSNAZ team has been slowed down by stiffer than expected resistance. The sun is about to come up over the Crimean Peninsula. The team and entourage drive south down the narrow

causeway aboard confiscated IKARUS buses. The locals are getting restless...

The Mission Editor Interface

Firing up the ME, you see that the interface is very functional and business-like. Windows are available by hitting [CTRL] key modifiers. You can drag your cursor around easily. Another improvement is the map view. The map of the Crimea is full screen, and the windows are transparent. This allows the widest possible view of The 'Big Picture', while it is also possible to zoom all the way down to the unit level. Creating a briefing is made difficult by the lack of place, city, and town names on the Crimean map in the Mission Editor. Another feature that would be nice is a terrain elevation readout under the cursor as USAF has; this would make low-level flights through the mountains easier to plan.



Causing Trouble

Regardless of your initial action, a pop-up menu enquires as to what side you will be fighting on. This window allows you to form coalitions between the four possible belligerents. In our mission, we have selected to be Russian, primarily because they have the carrier.



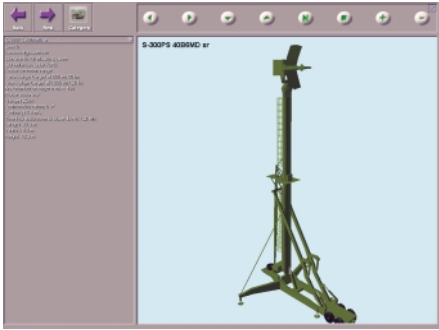
Pull down the Briefing window and set the mission Start At/Till time at the top. Enter your scenario under 'General Situation' in the Briefing window.

Placing Units

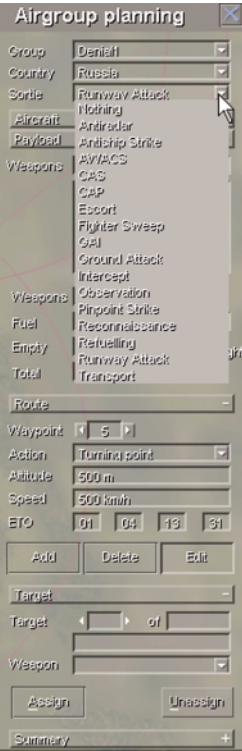
Placing units on the map is as easy as selecting the picture button on the Planning toolbar and clicking where you want them. A couple of clicks and we have the Kunetsov carrier group off the west coast of the Crimea. When you click the ship placement cursor on the screen, a pop-up menu prompts you to specify which ship you want to go there. Static objects are placed in a similar fashion, and while there are no waypoints to set, you can set their orientation - especially important for the carrier.

Flanker 2.0's excellent Encyclopedia reference function is not accessible within the ME screen. This is horribly inconvenient. You need to save the mission, close the ME, launch the Encyclopedia, get your info, close it, and re-launch the ME. What this does is take a potentially very useful tool and turns it into interesting but next to useless fluff.

Tasking your aircraft, selecting pilots and wingmen and weapon load-out is pretty straightforward in the Airgroup planning window. The choice of available stores is defined by the tasking of the aircraft, i.e. aircraft flying CAP are not given the choice to carry bombs. While this makes sense in the example given, it can be a bit restrictive. Since the flight is tasked to take out a runway that is defended by SAMs or AAA, it would be very advantageous to life and limb to have the choice of slinging an anti-radar missiles in addition to concrete busting rockets. Unfortunately, such fine-tuning of your stores is not an option. You

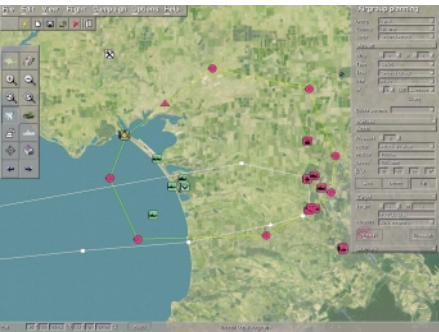


would have to task another flight to fly SEAD. The solution to this quandary was to select only Shilkas near the target, and not fly straight and level for very long while over bandit country.



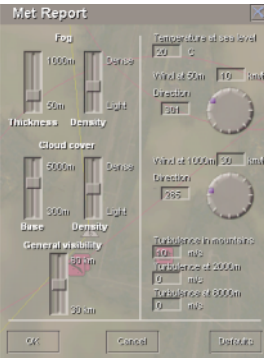
Setting Waypoints

Setting waypoints is simple, a point-click affair. Actions for these waypoints are set in the Airgroup planning window, with time over waypoint (ETO) obviously a factor of launch time and whatever speed you've set. Once again, make sure that your Mission Time is set correctly in the Briefing screen.



Throwing Wrenches in the Works

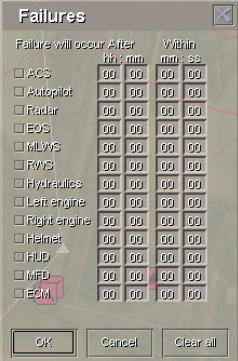
There's extra 'spice' that Flanker 2.0 throws into its mission planner that is missing in other combat sims - The Met Report and the Failures options.



The Met Report is a powerful weather generator, with the ability to set cloud cover, fog, wind, and even turbulence variables into your mission. These factors can and will obviously affect everything from

attacks to landings. Clouds are also just rendered well in this sim (only the clouds in Fly! are better).

The Failures option is also a trick thing. In addition to being a handy 'what if' tool to practice such emergencies as avionics failures and perforated engines, it can also be used on SAMs and radar installations of either side.



The list of possible things that can break is quite extensive, and is a fun and challenging addition that can change the flavour of even a milk-run mission very quickly.

Go Kill Something

Well, that's about it for basic mission building, comrade. The manual is a pretty good guide, and hopefully this article helps motivate and or help a bit. The mission included with this article, The Hell Outta Dodge can be found at <ftp://ftp.combatsim.com/missions/flanker2/f2-outadodge.zip> It is classified as a Pilot Mission. This means you are locked out and you cannot change anything. You are simply the grunt pilot who must fly as ordered. Enemy units are hidden as is intended.

If you want to get under the hood and see how all of this works, however, go to Edit and hit Declassify. When prompted, the password is 'groucho'. Hit Ctrl+H and select all, then hit Hide again. All of the units are there, ready for inspection and/or modification as you see fit.

Bob "Groucho" Marks

This above feature is reproduced from an article that originally appeared on CombatSim.com located on the web at www.combatsim.com. Thanks go to Douglas, Gale, Len and of course Bob Marks for their assistance when putting this piece together.



The Flight Simulator team 1999/2000. Back three from left to right: Dr Simon Newman, Paul King, Chris Jones. Front six from left to right: Dr Kenji Takeda, Professor Gordon Hodson, Mr Dave Whatley, Rosie Townsend, Peter Boltryk, Chris Jones



Southampton Super Sim

Flying with the professionals

Thinking about your next upgrade? Well, how about going the whole hog to build the ultimate flight simulation rig? That's exactly what the staff and students in the School of Engineering Sciences at the University of Southampton have done – with a healthy dose of help from British Aerospace. Furthermore, it's not as expensive as you might think.

Helicopter engineering lecturer, Dr Simon Newman and his colleagues were looking for a novel way to integrate aircraft design into the undergraduate syllabus of the aeronautics and astronautics degree course at Southampton. All of the skills learned throughout the course could be brought to bear on a real project – albeit a scaled down one. What better way to illustrate the final product than flying it yourself! This was previously done by making the students design and build a balsa wood chuck glider. This was a good start, but it would be more fun to sit inside the aircraft – and so the simulator idea was born, forming the core of the new Aircraft Design Laboratory.

A PIPEDREAM COMES TRUE

That was a couple of years ago, when Flight Simulator 98 was king and Pentium II 300s were still top dollar. After some deliberating and proposal writing it became clear that the concept of building a PC-based flight simulator to help in teaching and research was just the beginning of something big.

Pitching the idea to Gordon Hodson – retired British Aerospace's project director for the T-45 Goshawk Naval trainer, assistant chief designer for the Hawk and visiting professor at Southampton – set the wheels in motion. BAe's Simulation Group at Farnborough was particularly excited by the sound of this ambitious project, and was particularly taken by the price tag: a few thousand pounds, which in military terms is just petty cash. Richard Hickey and David Priddy of BAe were soon hooked, and the University gave the gargantuan task of putting this together to third-year aeronautics undergraduate student Abigail Gray.

Luckily for her, the technology was moving as fast as ever. Multi-monitor support



Official handover of the T4 Harrier seats to the University at BAe Dunsfold. From left to right: Abigail Gray, Peter Worthington, Gordon Hodson, Simon Newman, Peter Stroud, Graham Tomlinson and Richard Hickey

under Windows 98 would provide a new realm of possibilities. The generous folks at British Aerospace Dunsfold, home of the Harrier, were kind enough to donate two Martin-Baker ejector seats from a Harrier



The Hot Seat. Saitek X36 combo with Thrustmaster Elite Rudder Pedals sit on adjustable supports. The left-hand monitor is the second display for the main PC. The right-hand monitor is PC 2 running PFD software to generate the panel display



Lights out and eyes front. The simulator provides an incredibly immersive environment using off-the-shelf software and hardware

T4 trainer to the University for use in the simulator. While not strictly necessary, it certainly adds an extra dimension of authenticity to the set-up. More importantly, British Aerospace Military Aircraft and Aerostructures committed real money to help realise the project.

By the Spring of 1999 a room had been completely refurbished, the ejector seats made safe and the hardware and software ordered. The long aspect of the room meant that it was ideal for housing the simulator at one end, with a row of desks along the wall for two other PCs. To provide a truly immersive experience a roof-mounted multimedia projector was installed, running at an impressive 1024x768 XGA resolution. This shines onto the end wall, forming a crystal clear picture that is a massive 12 feet by 10 feet. Bigger than your average monitor! A second graphics card in the main PC drives a 19" monitor to show the instrument panel display from Microsoft Flight Simulator. The ejector seat is on a plinth,

sitting in the hot seat is truly breathtaking – utterly different to staring at your desktop PC from a few inches away. This is what true flight simulation is really about.

DETAILS, DETAILS, DETAILS...

It's always tough to bite the bullet and purchase hardware in the midst of such rapid developments. The system was ordered in February 1999, and represented the then state-of-the-art. See Hardware Heaven for details of the PC specifications.

The ATI Rage Fury card was cream of the crop at the time and performs well when coupled to the 450MHz Pentium II processor. The main display can push around 40-55 fps (frames per second) in Microsoft Flight Simulator 98, depending on the scenery density. In Flight Simulator 2000 the system can sustain around 15-20 fps with high detail levels. For serious suspension of disbelief around 30+ fps is a minimum, with 45+ fps providing the ultimate experience. The real problem is with stuttering and wildly varying framerates. That is where the dedicated Silicon Graphics Infinity Reality Engine simulators at BAe Farnborough really stand out. But the price differential between that and a PC-based system is around 20-30 times, taking it out of the realms of many budgets.

With the staggering pace of development the University is upgrading the main system already. Putting in the fastest Pentium III Coppermine processor, or AMD Athlon, coupled with a GeForce 256 graphics card will enable a significant increase in performance. The current development work is focussing on Flight Simulator 2000, and as we all know this is a real CPU hog. The extra levels of realism over its predecessor certainly make it worthwhile though, and backwards compatibility seems to be well covered.

HARDWARE HEAVEN

The Aircraft Design Laboratory was set-up to provide a network of computers not only for flight simulation, but also for providing design and analysis tools. Machine 1 is the main simulation PC, which drives the projector and an additional monitor. Machine 2 is a secondary flight simulation PC, to enable students to test fly their designs while the main simulator is in use. Machine 3 is for design and analysis only. All three PCs run Windows 98 and are connected with fast Ethernet.

The total hardware cost was a shade under £12,000. Of course, these days you can get much higher specification machines than these. Half of that was spent on the projector, but boy was it worth it!

Machine 1 - £1,850

Processing
Pentium II 450MHz
128Mb RAM

Primary Display
32Mb ATI Rage Fury AGP graphics card driving a Toshiba TLP710Z XGA Multimedia projector (£5,885) and an Iiyama VisionMaster Pro 450 19" monitor (£455) via a monitor splitter box

Secondary Display
8Mb ATI Expert 98 PCI graphics card driving an Iiyama VisionMaster Pro 450 19" monitor (£455)

Sound
SoundBlaster Live! 256 (PCI card) driving 80W speaker pair

Machine 2 - £1,250

Processing
Pentium II 450MHz
128Mb RAM

Primary Display
8Mb ATI Expert 98 AGP graphics card driving an Iiyama VisionMaster Pro 450 19" monitor (£455)

Sound
SoundBlaster PCI 64 driving headphones only

Machine 3 - £1,450

Processing
Pentium II 450MHz
256Mb RAM

Primary Display
8Mb ATI Expert 98 AGP graphics card driving an Iiyama VisionMaster Pro 450 19" monitor (£455)

Sound
SoundBlaster PCI 64 driving headphones only

Flight Controls
Saitek X36 joystick and throttle combo on machines 1 and 2 - £170
Thrustmaster Elite rudder pedals on machines 1 and 2 - £120
Quickshot Master Pilot with programming module on machine 1 - £70



Paul King explaining the multiple PC configuration to Richard Hickey of British Aerospace Farnborough

HOME OF THE SPITFIRE

Southampton has long been associated with the aviation industry. Perhaps its best-known export was the Supermarine Spitfire, designed by R. J. Mitchell.

Aeronautics has been taught at Southampton since 1931, with the sub-Department of Aeronautical Engineering being founded in 1951 by Elvin J Richards after he left Vickers-Armstrong (Aircraft) Ltd as assistant chief designer and chief aerodynamicist. In 1958, the year after Sputnik, the Department introduced astronautics into its teaching and was renamed accordingly.

In 1963 research interests in aircraft noise and structural vibration led to the formation of the Institute of Sound and Vibration research. Five years later a separate department of Ship Science was also spun-off due to the growing amount of research being carried out in yacht design.

Aeronautics and Astronautics has now been merged to form the School of Engineering Sciences, one of the largest multidisciplinary Engineering Schools in the UK.

Web site

<http://www.soton.ac.uk/~aeroastr>



Running Flight Simulator 2000 is a joyous experience, if a little jerky at present. The imminent hardware upgrade will push frame rates up to a smooth 40+ fps – wow!

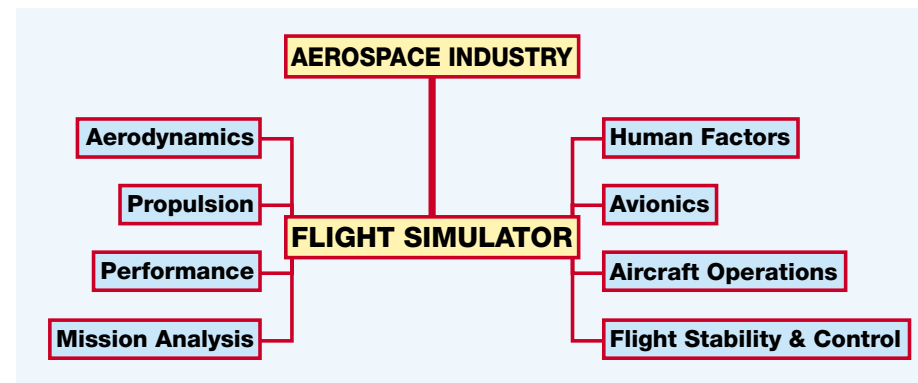
DESIGNS FOR THE FUTURE

While the flight simulator is certainly fun to fly, the reason for building it was to enhance undergraduate teaching and provide a serious facility for research and what better way to find how this would slot in, than to let the students take the lead. Lecturer Simon Newman is currently supervising nine undergraduate students on various aspects of the simulator. The main group, a team of four Master of Engineering final year students, has been tasked with nailing down the details of how the simulator can be integrated into various courses.

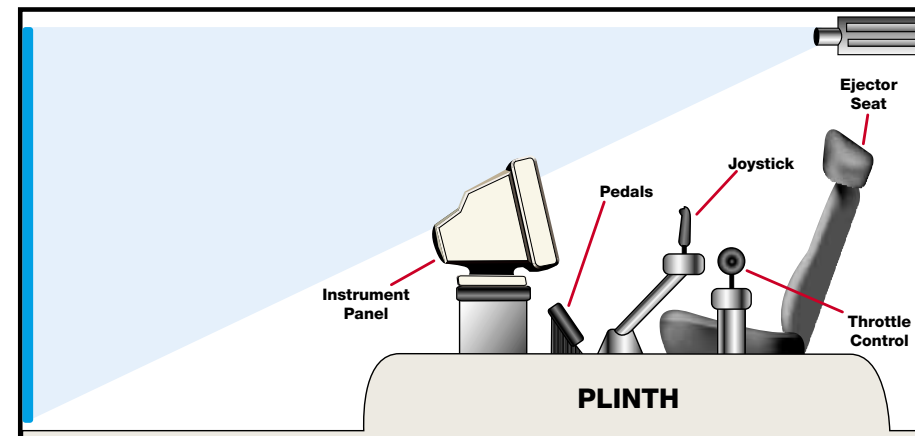
The overall aim is to use the simulator as a focus for teaching how the whole design process works. Taking an aircraft specification, the students must design the



aircraft using CAD/CAM (Computer Aided Design/Computer Aided Manufacturing) tools and produce a scale wind tunnel model. This can be tested in the tunnel to obtain aerodynamic data, which can then be fed into the flight simulator model. Finally, they can fly their aircraft to see how it really performs. Of course, if it is not up to scratch, then the loop can be restarted. The beauty of this process is that it is identical to what happens in a real aircraft design programme. It is understanding this design loop, and how the different parts interact, that is as crucial for young engineers to grasp as technical know-how. This is something that many undergraduate degrees fail to realise, and the simulator at Southampton is helping to reinforce this teaching methodology.



The flight simulator is more than just a toy. It contributes to many aspects of the undergraduate aeronautical engineering course and opens up possibilities of new research too

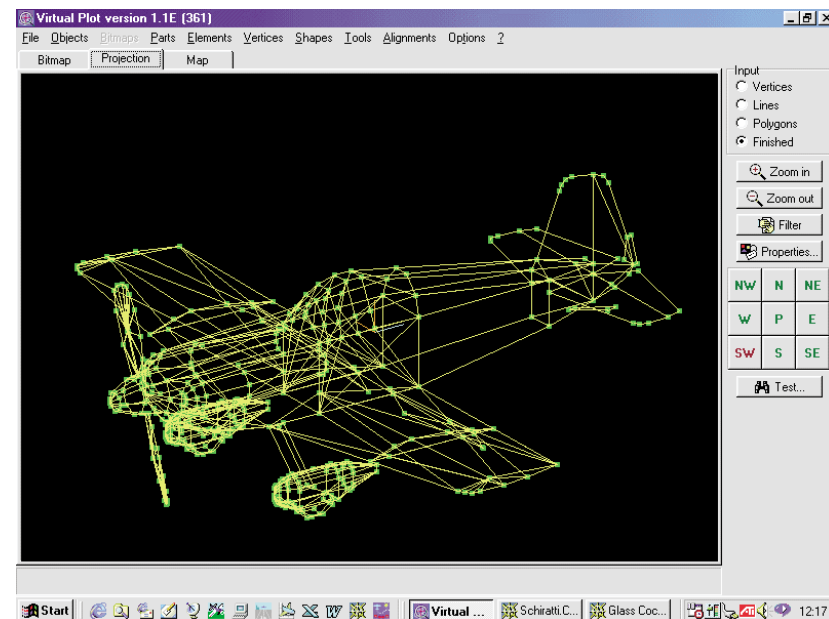


The ejector seat sits on a plinth, with custom-designed mounts for the monitors, joystick and throttle quadrants. Addition of a real aircraft canopy is a possibility in the future

At present there are five third-year students doing individual projects looking at particular aspects:

- Wind tunnel data conversion
- Simulation validation (Bulldog trainer aircraft in real vs. FS98/2000 performance)
- CAD to Simulator conversion
- OpenGL cockpit displays
- School of Engineering Sciences intranet development

One of the main problems is assessing new aircraft performance in an objective manner. This is one area that the Masters students are tackling head-on. Diving into the Flight Simulator 98 Software Developers Kit has allowed them to pull flight data out of Flight Simulator in real-time. The aim is to be able to plot aircraft flight data - such as forces, climb rates, roll rates and other parameters - in real-time. By doing this, it is possible to perform proper flight tests, just as in the real world. Flying set manoeuvres allows the pilot and designers to assess aircraft



Using VirtualPlot has helped close the design loop. Aircraft can be designed using Pro Engineer, a heavyweight CAE (Computer-Aided Engineering) package, and then converted to a more Microsoft Flight Simulator friendly format

SOFTWARE STAPLES

In order to make full use of the flight simulator, many different software products are being used. Microsoft Flight Simulator was chosen as the primary simulation package due to its expandability and multi-monitor support. X-Plane is also being evaluated.

A piece of software called PFD allows multiple PCs to be supported, which is particularly exciting and opens up many new possibilities. To design the aircraft, the industry-standard Pro/Engineer package is used, with VirtualPlot allowing conversion of the drawings to a Flight Simulator compatible format. The combination of all this software means that the design loop can be closed, with smooth data exchange into and out of Microsoft Flight Simulator being the ultimate goal.

Flight Simulator

- Microsoft Flight Simulator 98 and 2000
- FS98 Software Developers Kit
- X-Plane
- Aircraft Factory 99
- Custom Panel Designer
- Europe Scenery 3
- RAF Collection
- Luftwaffe Collection
- Flight Deck
- PFD
- WideServer and WideClient

Design Tools

- AutoCAD Release 14, draughting software
- Pro/Engineer and Pro/Desktop, Computer-Aided Engineering (CAE) design software
- VirtualPlot, CAD-conversion software
- ANSYS, structural analysis software
- CFX, aerodynamic analysis software

Lecture Support

- Video Capture (HyperCam, LotusCam)
- Microsoft Office 2000

performance in the correct manner. This will complement the real one-week Flight Test course (in a Jetstream) that is mandatory for undergraduates.

As well as enhancing the design aspect of the course, the simulator is already being used for teaching the fundamentals. The possibilities are endless, from demonstrating basic principles of flight and mission analysis to cockpit design and aircraft operations. The flurry of activity surrounding the new flight simulator, driven by the enthusiasm of students and staff, is providing enormous opportunities for teaching and research in many areas. Not only is the University excited, but also British Aerospace are realising what PC-based flight simulation can contribute to their business. With the tremendous pace of progress in PCs, there's no doubt that this is just the start. The future can only get better. ■

Kenji Takeda

BEFORE USING
THESE TUTORIALS

Know How Your Sim Operates.

How you operate your flight simulator program is up to you. Some flight simmers use simple joysticks. Others use advanced twist-grip sticks. Some rely entirely on the keyboard. A few flight simmers actually use yokes and rudder pedals. Our instruction assumes that you know how to operate your flight simulator program and you are familiar with its controls. If you are not, then do so now and return to your flight lesson when you are ready.

Fly One Step At A Time.

We hear from many flight simmers that want to skip over the basics and challenge themselves with heavy aircraft and instrument flight right off. While this is a great luxury of flight simulation, it deprives them of the skills they need for meeting advanced challenges. When encountering situations for which they are unprepared, flight simmers frustrate themselves with poor performance such as sloppy landings and even crashes. We strongly advise doing everything one step at a time and building your skills toward the next levels. That is one of the reasons why these lessons start at the basics!

Use These Tutorials For
Flight Simulation Only!

These tutorials are intended for flight simulation. No matter how much the programmers try to make their aircraft, panels and sceneries realistic, there are certain limitations to the program that cannot be overcome. As examples, the outside views are computerised depictions through windows that are about the size of a typical business letter envelope. There are no truly peripheral views, and the only way to see left or right is to manually change views, which is considerably more awkward than simply turning your head. The aircraft performances are not fully realistic in every detail. The joystick, mouse and keyboard operations are not realistic - real-world general-aviation pilots don't use them to control their real-world aircraft. While we have made every effort to make our tutorials as realistic as feasible, we have adapted them out of necessity to the limits and nuances of flight simulation, so some aspects cannot and do not apply to real-world flight. Therefore, we caution everyone to use these tutorials for their intended purposes, and we accept no liability for anybody's misuse of them.

PLEASE NOTE: We have created this series to be applicable to a variety of simulators – Microsoft Flight Simulator, Fly!, Flight Unlimited and others. However, the instruction has been based on Microsoft Flight Simulator as this is by far the most popular simulation in use. If you do not find the instructions or features we mention in your favoured sim, we apologize, but hope you will be able to adapt the tutorial as required.

Flight Sim Training

Professional instruction with Bill Stack VFR (Visual Flight Rules) Tutorial

Part 3 VFR Flight Using Dead Reckoning and Pilotage from Stansted (EGSS) to Birmingham (EGBB)

OUR FLIGHTS AND AIRPORTS

In this pair of tutorials, we shall fly from Stansted (where we landed in Issue 2) to Birmingham International Airport, which is about 80 nautical miles to the west/northwest.

Stansted is a busy commercial airport on the north-east outskirts of London. Starting as a World War II airbase primarily used by the USAF, Stansted is London's third commercial airport. Handling 8 million domestic and international passengers per year, it is London's fastest growing airport. More than 20 airlines operate from Stansted including British Airways, Aer Lingus and Virgin Express.

Birmingham International Airport is a busy commercial airport about 120 miles north-west of London. It was opened in 1939, served as a military airbase during World War II, and it has been operating as a civil airport since 1946. About 20 scheduled airlines, 20 charter airlines and numerous general-aviation aircraft use its runways. Our flight will bring us across beautiful English countryside in south-central England, which we shall see during our VFR flight.

The actual flight distance will be about 85 nautical miles, and it will last about 50 minutes from take-off to landing.

VISUAL FLYING KEEPS OUR ATTENTION

The objective of this VFR (Visual Flight Rules) tutorial is to fly cross-country from one airport to another using time, distance and speed to determine our position. This basic navigation method is called dead reckoning. For some flight simmers, much of the scenery is fairly bland. For those with the latest flight simulators (such as Flight Simulator 2000) or with enhanced UK scenery add-

ons, the scenery is a bit more interesting. Nonetheless, there won't be enough landmarks for truly effective pilotage.

SELECT YOUR AIRCRAFT

For learning how to fly, small general-aviation aircraft are most appropriate. After you learn the manoeuvres and methods, you can try bigger and faster aircraft if you wish. For your first flight of this tutorial, use a small general-aviation aircraft such as a Cessna 172/182, Bonanza or Bravo. Since we haven't used a retractable-gear aircraft yet, use one this time to give you something else to do during take-offs and landings.


SET YOUR WEATHER

Use zero winds, zero turbulence and clear skies for your first time on this flight. You can add mild winds, a little turbulence and a few clouds for later flights if you want. For runway selection purposes only, we shall assume that winds are typically westerly even though we are not using them. Therefore, we shall take off from Stansted's runway 23, which heads 230 degrees, and land at Birmingham's runway 33, which heads 330 degrees.

MAKE A FLIGHT PLAN

Our visual flight plan shows our general route. We shall cruise at 4,500 MSL, which is consistent with regulations. Aircraft flying visually in any westerly direction (180 to 359 degrees) fly at even altitudes plus 500 feet (i.e. 4,500, 6,500, 8,500 ft, etc.). Our 4,500 MSL altitude is good for short visual flights from one city to another.

In the real world, pilots would file a copy of their flight plan with ATC. We shall make only an original and imagine that we have filed a copy with ATC in



All the charts used in our tutorials have been specially supplied and reproduced with kind permission of Jeppesen GmbH .

We would like to thank Heinrich Schaible, Andrea Stumpf and Ilka Arns of Jeppesen Europe for their efforts and help with this issue of PC Pilot Magazine.

Please note: these charts are NOT to be used for real navigational purposes. They are for information ONLY. All charts are ©2000 Jeppesen GmbH

accordance with regulations. We shall keep our flight plan handy throughout the flight so we can easily refer to it. After our flight, we can file it in a folder or loose-leaf notebook, or we can discard it.

PREPARE AND BEGIN YOUR FLIGHT

Prepare your flight exactly as we did in our second tutorial, when we flew from London City airport to Stansted airport. Note the time of your take off, because you will use elapsed time as a factor in determining your position en-route. Take off and climb out as explained in our first two tutorials. Be sure to raise your landing gear after taking off if you're using a retractable-gear aircraft.

For space considerations, we shall not repeat common aspects in every tutorial. If you require previous issues then you can order these from www.pcpilot.net or write to us.

EMBARK ON YOUR ENROUTE FLIGHT

Once you reach 1,400 feet MSL, which is about 1,000 feet AGL at Stansted, make two course changes: (1) Change your climb rate to 500 feet per minute if it has been more than that. This vertical climb rate is easy on occupants, and it enables a productive airspeed during the climb; (2) Turn right and head 305 degrees toward Birmingham. In zero winds, this heading will bring us just east of Birmingham airport so



Climbing turn from Stansted toward Birmingham

we can see it out our left-front window as we approach the area. Note the time when you begin heading 305. After these changes, continue climbing to our cruising altitude of 4,500 feet MSL.

ADJUST YOUR AIRCRAFT FOR CRUISING

Maintain your 4,500 MSL cruising altitude and a 140-knot airspeed until you get near Birmingham. Elevator trim or autopilot can be used for maintaining altitude. Using elevator trim requires a few adjustments after which the aircraft will generally maintain its altitude. Using autopilot relieves the tedium of manually maintaining altitude, but it deprives us of needed flight experience.

COMMUNICATE WITH AIR TRAFFIC CONTROL

Contact ATC at airport whose airspace you pass through. Airport airspaces are shown on the visual chart by blue and/or red circles and by red shading. ATC frequencies are shown near the airport's name. If the frequency is not shown, the airport is probably uncontrolled, so the ATC requirement doesn't apply. If your simulator lacks ATC features, simulate compliance with this requirement yourself.

PRACTICE ATTITUDE FLYING

The 20-minute cruising portion of our flight is an ideal opportunity for practicing attitude flying. This

TRACK YOUR PROGRESS

You can use two methods for tracking your progress: dead reckoning and pilotage. Dead reckoning uses time, heading and speed calculations to determine position. Our 305 heading at 140 knots will place us at certain points at certain times. After the passage of a certain number of minutes at a given heading, we can plot our position fairly precisely on a chart. Pilotage uses landmarks on the ground for determining relative position. It is an accurate navigation method although not as sophisticated as radio navigation.

Our 305 heading will take us past several cities, towns, roads, rivers and airports that we can use to verify our position en-route. Not all the features shown on the VFR chart may be reflected in the flight simulation scenery, so we must make do with what we have. The best example of this shortfall is the lack of small airports. Henlow, Cranfield and Coventry are not shown in Microsoft Flight Simulator 98 default scenery, for example. Also, rivers and roads between Stansted and Birmingham are too difficult to follow visually in this scenery. These weaknesses leave us cities, towns and villages for visual references and rely

more on dead reckoning than visual pilots in the real world would do for this particular route. Be sure to check your heading frequently. If you are not flying absolutely straight and level, your heading will change gradually. Small heading changes are easy to miss when we're looking for landmarks below you. Heading a few degrees off course can cause you to fly past your landmarks without being able to see them.

To see how dead reckoning works, estimate your position every few minutes and compare your position to landmarks on the ground. At 140 knots, for example, we travel 2.34 miles every minute. Multiply the number of minutes travelled by 2.34, and then plot the result along your course. This method will not be absolutely accurate if your airspeed varies during the period, but it will be close enough. Eight or nine minutes after departure, we should be approaching or passing a small urban area. This town is

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Bill Stack is an expert flight simmer, the author of numerous training manuals for flight simulation computer programs and the owner of Training Associates in the USA. Training Associates publishes and distributes reference and self-learning books about flight simulation and other subjects.

The books that cover various flight sim subjects are:
Flight-Sim Pilot's Information Manual 1999
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Nels Anderson, technical advisor for these tutorials, is a general aviation pilot and president of www.flightsim.com

Letchworth, about 18 nautical miles from Stansted. Bedford is the next urban area. It's approximately 30 nautical miles from Stansted, so at 140 knots we should arrive there about 13 minutes after departure and about five minutes after passing Letchworth. Look for the urban



Passing Bedford en-route to Birmingham

area around several rivers. Bedford is larger than Letchworth. The next urban area for our reference is Northampton, about 14 nautical miles from Bedford. It's larger than Bedford, and also has several rivers surrounding it. We should be there about ten minutes after Bedford and 23 minutes after leaving Stansted.

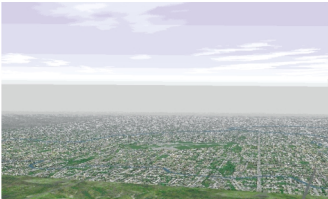
When you are on your 305 heading, you should see these landmarks at approximately these times from Stansted and from one another.

BEGIN YOUR DESCENT

A small town about 15 miles after Northampton is Rugby. At our 140-knot airspeed, we should fly by it about seven minutes after passing Northampton. As Rugby is about 15 miles outside Birmingham, we shall be less than ten minutes from Birmingham when we pass it. This is where we should begin our descent.

With Birmingham's airport elevation being 325 feet above sea level, a good traffic pattern altitude of 1,000 AGL would be about 1,400 MSL. Descend at 500 feet per minute until you reach this altitude, and then use your elevator trim to hold your altitude and use your throttle to hold your 110-knot airspeed.

The next city after Rugby is Coventry. Notice the river running through it. Coventry is the final urban area we shall pass before reaching Birmingham. In fact, the



Arriving at Birmingham with the airport just inside the urban area.

urban area beyond Coventry is Birmingham. The airport is just inside the urban area, and it will appear in a couple of minutes.

CONTACT BIRMINGHAM TOWER

Contact Birmingham approach control at 118.05 and announce your intentions to land there, or simulate this contact yourself. ATC manages this busy commercial airport strictly. In lieu of ATC vectoring and clearance in our simulators, we shall adhere to a standard airport traffic pattern.

Birmingham's two runways are 15/33 and 06/24. With 15/34 being 8,547 feet (2,605 metres) long and 06/34 being 4314 feet (1,315 metres) long, both are adequate for landing in a light general-aviation aircraft. With our assumed westerly wind (even though we are not using winds right now) and from our arrival direction, runway 24 is most convenient for our landing. Pilots would tell ATC of their intention to land on that runway and receive clearance for the procedure.

RE-ADJUST YOUR AIRCRAFT

Return your propeller and fuel mixture to their original positions, if you adjusted them when you reached cruising altitude. Be sure your propeller is fully advanced so you will have all the thrust needed during your approach. Little could be worse than not having full thrust when needed close to the ground. Using too lean a fuel mixture can cause your engine to overheat. Also, activate your carburettor heat to prevent ice from building up in your carburettor during this low-power descent.

Check the local barometric reading in the weather briefing or ATIS and adjust your altimeter accordingly. Remember that every one-tenth-inch error on your altimeter can make you believe you are one hundred feet above or below your actual altitude. This difference might not seem like much when you are 4,500 feet above the ground, but it can cause real

problems when you are close to the ground for your traffic pattern and especially for your landing. The ATIS frequency for aircraft approaching Birmingham is 126.27.

JOIN THE TRAFFIC PATTERN

To approach runway 24 for a landing from our direction, we shall enter the traffic pattern on its downwind leg. Our path is shown on the chart.

Birmingham airport should appear in the left portion of your front window or the right portion of your left-front window, or both. When you see it, turn left 65 degrees at a 20-degree bank to a heading of 240. This heading will take us south of the airport and parallel to runway 24. Continue descending to our 1,400 MSL pattern altitude (if you haven't already reached it).

As you get closer to the airport, all its features will become clearly visible in your right view windows. You will see the two runways, the taxiways, the aprons, the airport buildings and the north and south terminals. If you are familiar with this airport, you might recognise some of the features.

When you see the middle of runway 06/24 in your right window, turn right 90 degrees and head 330 toward the airport. As soon as the runway is clearly distinguishable ahead of you, turn right 90 degrees and join the downwind leg of the traffic pattern at a heading of 060.

As you execute your 90-degree turns in the traffic pattern, be sure to maintain a 20-degree bank, your 1,400-MSL altitude and your 110-knot airspeed. Descending is normal in turns because of the diminished lift. The descent will increase your airspeed, and it will bring you too close to the ground. Monitor your airspeed indicator, attitude indicator, altimeter, heading indicator and vertical speed indicator throughout these turns, and adjust your pitch, bank and power as needed.

Continue flying this traffic pattern, then approach and land exactly as shown in our first two tutorials. Be sure to lower your landing gear before reaching the final approach.

Congratulations! You have just flown a rather ordinary visual flight without use of any navigation instruments. For more challenge, fly it again with a more sophisticated aircraft.

You can see from this simple flight that visual flying is not easy - it requires close attention throughout and enables little opportunity for sightseeing. Anyone who says that visual flying is not challenging enough should actually do it to see what it's really like!

Next issue we shall use radio navigation aids to fly a longer route, and we shall apply winds to make our navigation more realistic.

You can read more about Birmingham International Airport at www.bhx.co.uk/

Bill Stack

Instrument Flight With a Non-Precision Approach

Part 3

Flying from London Stansted (EGSS) to Birmingham International (EGBB) with an NDB approach

The objective of this IFR (Instrument Flight Rules) tutorial is to fly en-route using radio navigation aids and approach the airport using a non-precision approach procedure. A non-precision approach lacks the precise altitude guidance provided by a localizer and glide slope. We will approach Birmingham using an NDB procedure and land on runway 33. You, the pilot, will be unable to see anything outside your aircraft from just after taking off to just before landing.

Our flight plan reflects our flight path. Normally, pilots would make their flight plans in duplicate, submit a copy to ATC and use their original in the cockpit. In lieu of ATC, we will make one flight plan, use it during our flight and file it after our flight in a folder or loose-leaf binder.

SELECT YOUR AIRCRAFT

Some simmers would like us to use jetliners in our tutorials. Frankly, we think that's a bit ambitious for simmers who are still learning the charts and procedures. We'll show you how to fly in general-aviation aircraft, then you can try it in jetliners if you wish. So for your first flight of this tutorial, use a small general-aviation aircraft such as a Cessna 172/182, Bonanza or Bravo. We haven't used a retractable-gear aircraft yet, so use one to give something else to do during take-offs and landings.

SELECT THE RUNWAY

We should assume winds whether we actually use them or not. For runway selection purposes, let's assume a typical westerly wind as we have been doing in all our tutorials so far, even though we shall not actually use winds on the first flight of this tutorial. Accordingly, we shall take off from Stansted's runway 23, which heads 230 degrees, and land on Birmingham's runway 33, which heads 330 degrees.

SET YOUR WEATHER CONDITIONS

To create the weather conditions that mandate our instrument flight, establish an overcast that will prevent you from seeing anything out of your windows for most of your flight. As flight simmers, we have the luxury of choosing our weather. As the NDB approach procedure at Birmingham shows a decision height of 800 feet MSL, we need to choose an overcast ceiling that is no lower than this. Let's use 1,500 feet MSL. You can lower your

ceilings for future flights if you like. The en-route airway shows 8,000 feet MSL, so let's set our cloud tops at no lower than 9,000 feet MSL. These cloud settings will keep us in visibility-obscuring clouds for most of our flight.

As we have been doing in our tutorials so far, we are not using winds or turbulence in the first flights. You can add winds for your subsequent flights if you like.

READ YOUR CHARTS

The charts show our route from Stansted to Birmingham as well as instrument procedures for using each airport.

Departure. The SID (Standard Instrument Departure) chart for northerly departures from Stansted 23 is considerably less complicated than the charts for southerly departures. It shows minimum climb rates, general flight paths, and precise headings and fixes for us to use.

En-route. This chart shows the airways and navigation aids we shall use from just after leaving Stansted to just before arriving at Birmingham.

Arrival. The STAR (Standard Terminal Arrival) chart and the IAP (Instrument Approach Procedure) chart show the procedures we shall use between our en-route portion and our landing at Birmingham.

Familiarize yourself with all relevant aspects of these charts before taking off so you won't have to fumble around in the aircraft trying to figure them out. Note that some of the instrument procedure charts are not to scale, so the courses depicted on them are not precisely drawn. On these charts, follow the textual directions and use the graphical depictions for comprehension only.

SET YOUR RADIOS AND GAUGES

Set your radios and gauges for the frequencies you will need as shown on the charts: (A) Barkway VOR (BKY) 116.25 and Brookman's Park VOR (BPK) 117.6. If your radios enable the setting of standby frequencies, do that. Otherwise, be prepared to enter new frequencies when necessary. Also, set your OBIs so the headings and needles are approximately where they will be when you intercept them at the appropriate time. For example, set OBI 1 or 2, as appropriate, for the 160 radial you will need for Barkway, where you will make your first turn just after taking off. Setting these OBIs in advance saves you the hassle of trying to set them

while you're busy doing a lot of other things.

Be sure your altimeter is properly set for local barometric pressure. Precisely following this SID requires us to be where we should be when we should be there. Even a slight altimeter error can make us believe we are enough above or below our actual altitude to create real problems for other aircraft using the airspace - aircraft we cannot see and who cannot see us because of the low-visibility weather conditions that mandate our instrument flight.

TAKE OFF NORMALLY

Take off as normal, including cockpit preparation and appropriate ATC clearances, as explained in our previous tutorials.

For space considerations, we will not repeat aspects in each tutorial - contact us if you require a back issue or order direct from www.pcpilot.net

DEPART STANSTED

Overall, the SID shows that aircraft taking off from runway 23 for northerly departure should climb at a certain rate, turn right at a certain point, head to a VOR, and be at certain altitudes when crossing certain fixes.

After Barkway VOR, the published procedure directs aircraft westward then southwest toward central London. This route is impractical for our west/northwest flight to Birmingham, so we will exit the SID at Barkway and join the en-route airway.

Here's a step-by-step way to follow it: (1) Climb at no less than 310 feet per nautical mile. A conversion table on the chart shows that this minimum climb gradient can be achieved at a ground speed of 75 to 100 knots by climbing at no less than 395 feet per minute. (2) Turn right when you intercept the BKY

160/340 radial. (3) Follow BKY's 355 radial inbound. (4) Level off at 3,000 feet MSL and maintain that altitude until you reach Barkway.

JOIN THE AIRWAY

When we reach Barkway, we will join airway B317. Airway B317 goes from Clacton VOR westward to Davenport VOR. Notice on the chart that airway B317 passes just north of Barkway and Cranfield VORs. Cranfield is about halfway to Davenport.

Once you reach Barkway VOR, notify ATC at Stansted. They will hand you to London Control. If your simulation lacks this ATC level, simulate the switchover yourself.

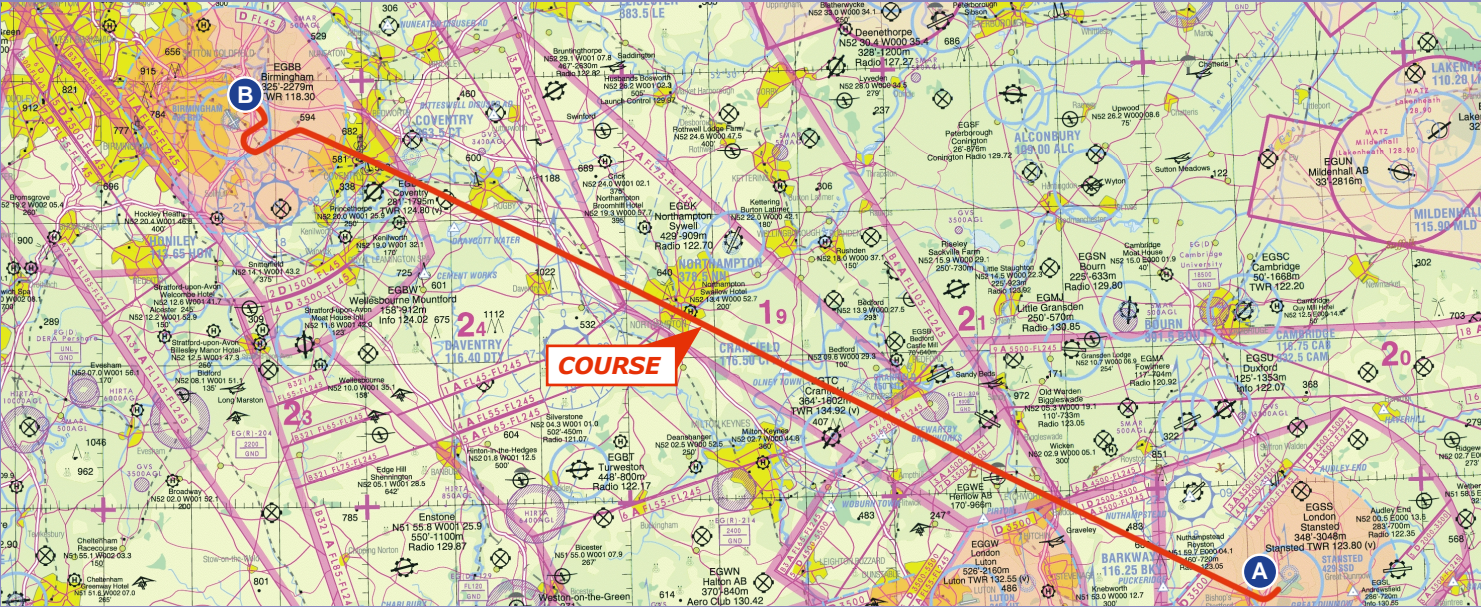
Climb to, and maintain, 8,000 feet MSL, which is airway B317's minimum altitude as shown on the chart. As airway B317 does not intercept Cranfield VOR, we should fly by it without attempting to intercept it. This portion of our flight will take about 10 minutes.

TRACK YOUR PROGRESS ENROUTE

The 20-minute en-route portion of our flight is an excellent opportunity for tracking our position with radio navigation aids. Here are three common ways of doing it.

VOR Triangulation. Determine the radials you are intercepting from two VORs, and then see where they intercept on your chart. For example, if you are intercepting Barkway's 290 radial and Cranfield's 080 radial, your position is about halfway between the two VORs.

DME (Distance Measuring Equipment) Tracking. When you are a certain number of miles from a VOR with DME along a given radial, you should be at a certain



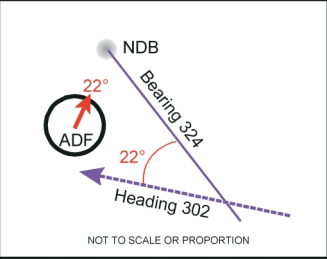
London area VFR chart showing approximate VFR flight path from Stansted to Birmingham

- (A) Stansted Airport
- (B) Birmingham Airport

point. For example, when you are 23 nautical miles from Daventry VOR along its 107/287 radial, you are about halfway between Barkway and Daventry. Cranfield VOR provides no signal for our DME, so it is useless for tracking positions by itself.

NDB Triangulation. When you know you are flying along a course such as airway B317, you can use an NDB to the left or right of you to plot your position along that airway. For example, when you are heading 287 toward Daventry VOR along its 107/287 radial and your ADF shows Westcott NDB (335) at 310 from your aircraft, you are about halfway between Barkway and Daventry.

Follow your progress along your course toward Birmingham using any or all these positioning methods. In addition to giving you something to do during your flight, these are the only ways of knowing where you are and whether you are



The ADF shows the position of an NDB relative to the aircraft.

on course when you cannot see anything out your windows and you have no ATC to tell you where you are.

PRACTICE ATTITUDE FLYING

The en-route cruising portion of our flight is also a great opportunity to practice attitude flying. If you're unfamiliar with this method, refer to this section in the VFR tutorial in this issue.

CHANGE HEADING

When you reach Daventry VOR, turn right and head 302 toward Honiley VOR (113.65). Also, begin your descent toward Birmingham. The target altitude is 2,000 feet MSL, and this portion of our flight is about 20 nautical miles. At 140 knots, we can easily reach 2000 feet MSL over 20 miles at a 500 foot-per-minute descent rate.

Contact London Area ATC and notify them that you are descending toward Birmingham. They will wish you well as you leave their auspices.

JOIN BIRMINGHAM APPROACH

The NDB approach for Birmingham's runway 33 shows a lot of manoeuvres that we shall forego. It calls for aircraft to pass over the airport at 2,500 feet MSL, head 167 degrees afterwards, then reverse course to the left for a 324-degree approach. As we are approaching from the south, most of this procedure is unnecessary for us. We shall simply join the approach from Honiley VOR at 2,000 feet MSL then follow the NDB to the airport on a 324 heading - all with ATC clearance presumed, of course.

Here's a step-by-step method for executing this NDB approach: (1) Set your altimeter for local barometric pressure. (2) Tune your Nav1 radio for Honiley VOR (113.65) and your ADF for Birmingham NDB (406). Don't be alarmed if your ADF initially reads about 110, because Wittering NDB 45 miles to the northeast uses the same frequency. You will receive Birmingham's NDB soon enough. (3) Be at 2,000 feet MSL when you pass Honiley VOR. (4) Proceed on your 302 course after passing Honiley VOR. (5) Switch your OBI1 to the ILS at Birmingham (110.1). We shall not use the ILS here, because we're practicing an NDB

approach, but we need the ILS's DME for positioning. Cover your OBI1 with opaque tape or a sticky note to keep it from distracting you, and be sure to leave your DME exposed. (6) Turn right and head 324 when your ADF needle shows Birmingham NDB at 22 degrees relative to our heading. (7) Reduce airspeed to no more than 120 knots.

Remember that an ADF doesn't show our position relative to the NDB as OBIs do with VORs. Instead, it shows the NDB's position relative to us. So when we're heading 302 and our desired path is 324, we shall intercept that path when the NDB is 22 degrees relative to us (324 course less 302 heading equals 22 bearing).

Two fixes and one altitude along this approach are significant:

D5.1. This fix is 5.1 miles from the airport, and it is the point where we begin descending toward the runway from our 2,000 feet MSL altitude. When the DME shows us 5.1 miles from the runway, begin descending at 500 feet per minute and reduce airspeed to no more than 100 knots.

D4.0. This fix is 4 miles from the airport, and it shows a minimum descent height at this point. We should not descend below 1,680 feet MSL until after we have passed this fix.

800 MSL. This minimum altitude is not shown on the approach chart at a specific point. Instead, it is a minimum altitude that we should fly before deciding whether to land or abort. When we reach this altitude on this our heading, we should be clear of the clouds and be able to see the runway environment ahead of us. If we do see the runway environment from this altitude and we are horizontally and vertically aligned with it for a safe landing, we can proceed with our landing. The runway environment includes the approach lights, so if we see them, we can continue with our approach.

Otherwise, we should not proceed with a landing.

These descents can be done in steps rather than a steady slope toward the runway. When you pass D5.1, descend to 1,680 feet MSL at 500 feet per minute and hold that altitude until you reach D4.0. Then descend to 800 feet MSL at 500 feet per minute and hold that altitude until you see the runway environment.

Do not attempt to land if you are excessively high or low or more than 30 degrees left or right of the runway. If you followed the procedure properly, you should be positioned for a safe landing.

MISSED APPROACH?

If you need to execute a missed approach, the chart tells and shows how to do it. (1) When you reach the fix labelled D0.0, which is right above the runway, level off and notify ATC of your missed approach. (2) Climb straight ahead to 2,500 feet MSL or D2.0, whichever is the later. (3) Execute a level right procedure turn, as shown by the dotted line. (4) Return to the locator (NDB). (5) Re-execute the landing approach from there.

CONGRATULATIONS

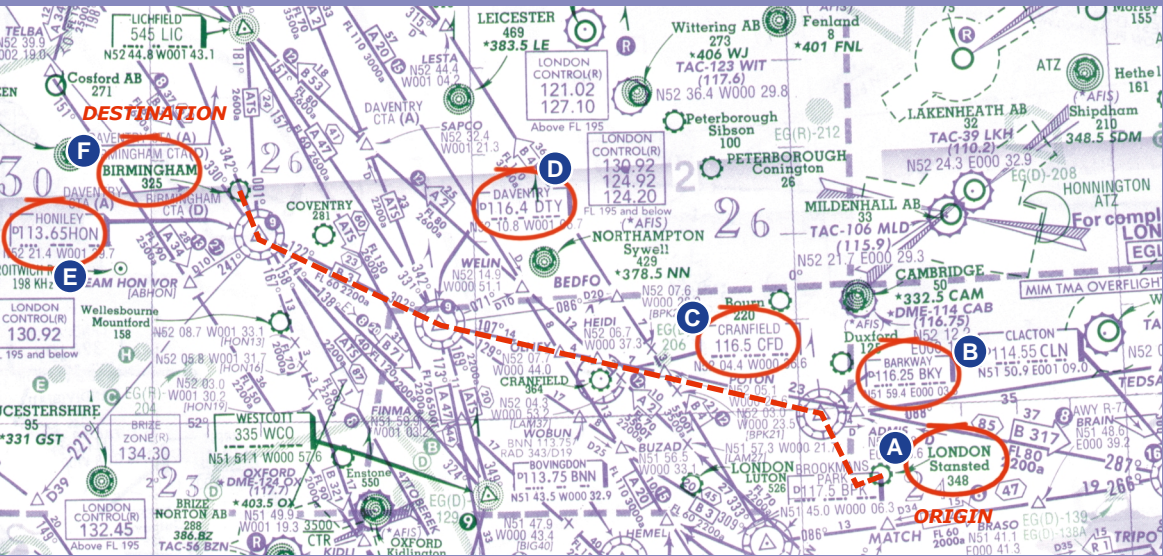
You have successfully flown en-route from one airport to another using an airway and several VOR's. You have practiced attitude flying, and you have executed an NDB (non-precision) instrument approach. Well done, indeed!

Keep flying this tutorial to build your proficiency. Apply winds and turbulence and advance to more sophisticated aircraft to make it more challenging if you like.

You can find out more about Birmingham International Airport at www.bhx.co.uk

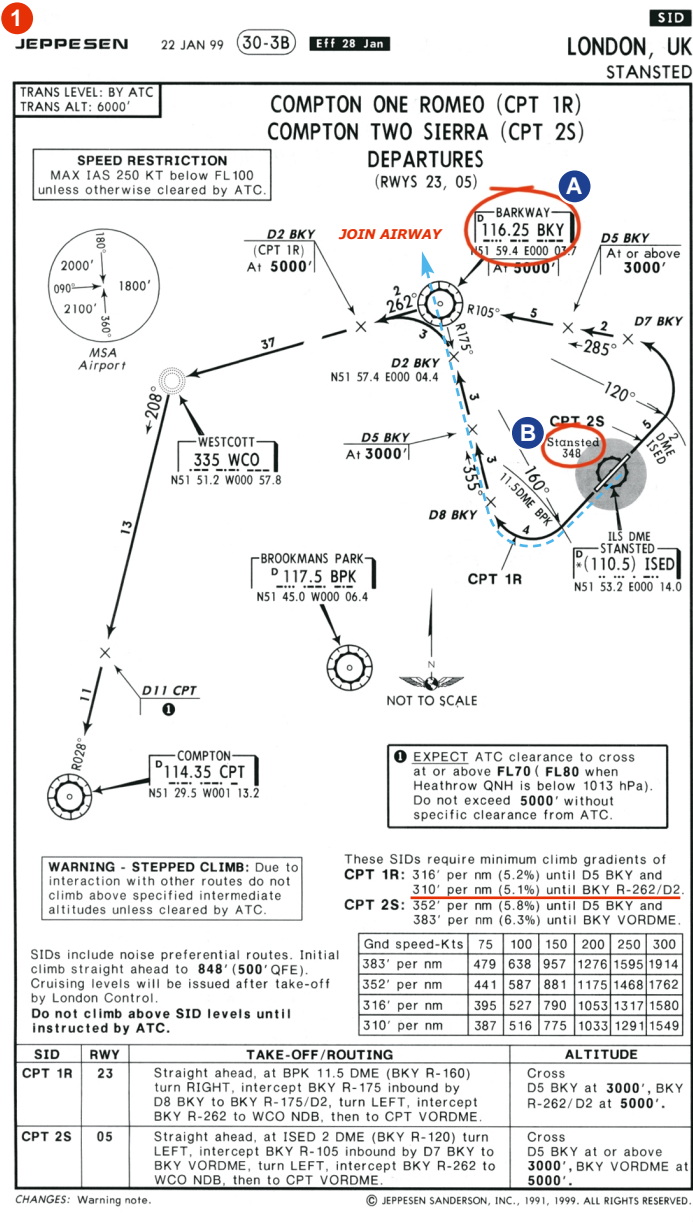
See you next time!

Bill Stack



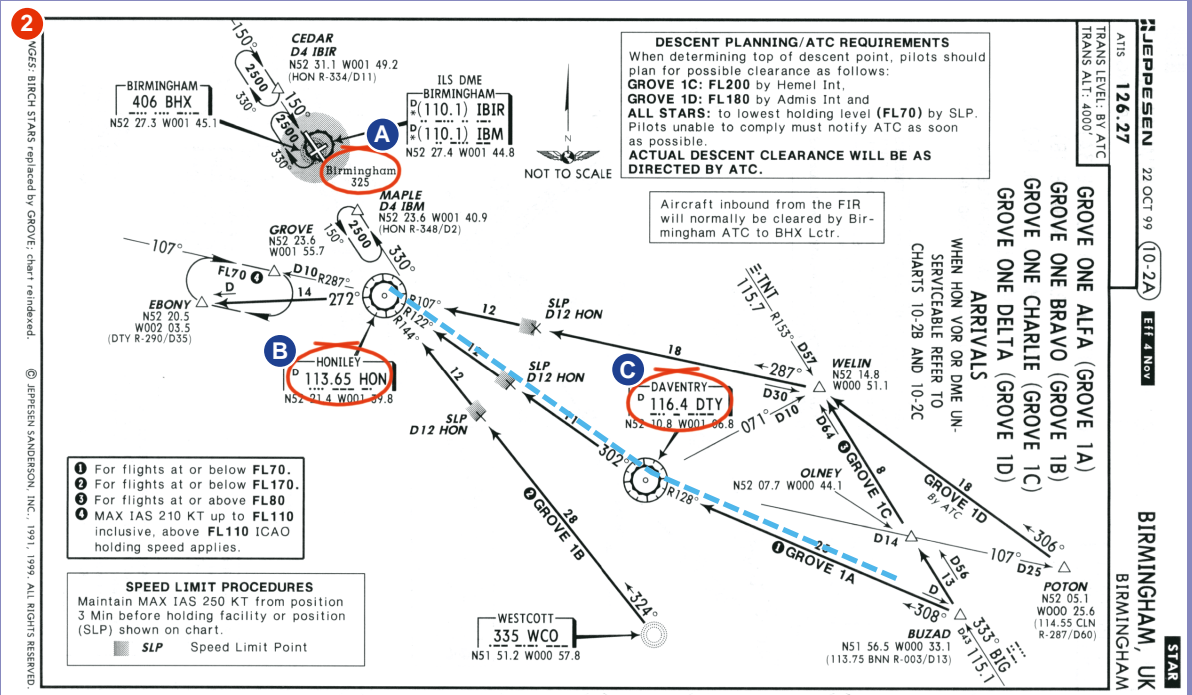
London area chart showing approximate IFR flight path

- A Stansted Airport
- B Barkway VOR
- C Cranfield VOR
- D Daventry VOR
- E Honiley VOR
- F Birmingham Airport



SID chart showing instrument departure from Stansted Airport

- 1 A Barkway VOR
- B Stansted Airport
- 2 A Birmingham Airport
- B Honiley VOR
- C Daventry VOR
- 3 A Birmingham Airport
- B ILS/DME
- C NDB
- D Fixes



NDB approach chart for Birmingham runway 33

DON'T TAKE OFF WITHOUT US!

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Issue 3

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Controlling aircraft in these modern times means most of us are familiar with the feel and look of a flight yoke, rather than the old 'schtick'. Generally being affordable, user-friendly and much more suitable for combat, joysticks can leave those that enjoy glass cockpits, flight management computers and moving maps somewhat dissatisfied. Thus we enter into the next realm of game controllers; flight yokes and rudder pedals.

A relatively small round up this issue, there simply is not a large enough selection of product available to the consumer. What we have, however, is a good/better/best solution that should help any of you considering an upgrade. Let's see what happened when we pushed, pulled, yanked, and kicked our way around the skies!



rocker switches, plus an 8-way hat switch.

Mounting the yoke on a thin desk required a little tweaking, since the provided clamps snug down to only 1 inch. We also found that it required 'shims' in the rear, where the yoke body contacts the desktop. Without the 'shims' (which were simply pieces of closed-cell foam) the yoke pointed steeply upwards, which was both unrealistic and uncomfortable.

The performance factor could be considered good, though the test unit we received had 'stickiness' in the elevator controls. We took it upon ourselves to clean thoroughly the yoke's main shaft and coat it with petroleum jelly, which helped a little, but not absolutely. Fortunately, we were able to lay our hands on another yoke of the same vintage, and this one operated much more smoothly.

The aileron and elevator resistance is not quite what one would experience in a genuine aircraft, whether it is a J-3 Cub or Boeing 767. CH could perhaps improve the realism factor by increasing

Flight Sim Yoke PC

Manufacturer: CH Products

Web: www.chproducts.com

Price: £89.95 (in UK), \$99.95 (in USA)

Possibly the yoke many upgrades are made of, the £90 CH Flight Sim Yoke is an addition quite worthy of consideration. It offers easy set up, plenty of programmable buttons and overall good aircraft control.

Moulded in high-density plastic, the FlightSim Yoke PC links with your computer through its 7 ft. gameport connector cable (CH also produces a USB version, but we were unable to obtain one before we went to press). It comes equipped with a throttle handle, trim wheel, two 'panel' mounted 2-way switches, three button switches, two

TEST BED

All testing was conducted with the following hardware arrangements:

450 MHz Pentium II
128Mb SDRAM
Abit BH6 Motherboard
Voodoo3 2000 AGP video Card
Creative Ensoniq Audio PCI card
Seagate 4.3 Gb Hard Drive
Windows 98

550MHz Celeron
192Mb SDRAM
Abit BH6 Motherboard
Creative TNT2 Ultra video card
Creative PCI64 Sound card
Maxtor 5.1 Gb Hard Drive
Windows 98

the tension springs within the housing and inserting some weight into the yoke handles.

The other weakness of the unit is the throttle handle, which performs fine but seems like an after thought (this may have been intentional on the part of CH, since they have the Pro Throttle in their arsenal). It is a tiny, almost pathetic looking handle that can become lost in your hands.

The retail package includes the yoke and cable, mounting hardware, and a CD packed with goodies; drivers for all CH products; demos of Warbirds, Air Warrior and X-Plane; Direct X 6.1, Netscape 4.5, plus even a few Macintosh programs.

explore and see if we get our money's worth...

The contents of the package include the aluminium and steel yoke assembly, separate throttle handle, connection cables, instruction sheets, and software disk. The yoke is powder coated glossy black and looks like it belongs on the jetliner you last flew in. Indeed, the folks at Precision Flight Controls (who are the manufacturers) use the mould from a Saab 340 yoke to fabricate this beauty.

Desktop mounting is required, so just like the CH yoke you need some additional material under the clamps for a secure fit. Installation and calibration were a snap, as AETI has somehow managed to utilise the very same drivers as the previously tested CH Flight Sim Yoke PC. Very nice.

The first grasp of the yoke reveals that something special is at your control. The combination of appearance, weight, and most importantly the 'progressive response tension' system can quickly transport your mind onto the flight deck of your favourite aircraft. The yoke houses 4 push buttons and 4 rocker switches that are easily programmable within your favourite simulator. The only thing (though perhaps trivial)

that we didn't like is the close proximity of the rocker switches. Our thumbs could not always decipher where the separation of the switches was, causing a brief moment of hesitation before pushing a button. That aside, the sensation of flight, in our opinion, has never been so realistic.

The AFCS II probably will never be mass produced and sold in retail stores. It serves a niche in the world of simulation, and does so with impeccable precision.

Guaranteed for one year, the customer is responsible for all shipping costs. AETI claims they have not received a single unit back for repair!

AFCS II Yoke

Manufacturer: AETI
Web: www.simpilot.com
Price: Approximately £400 (in UK), \$495.00 (in USA)

Every so often we all cross paths with something brilliant, something that instantly causes our jaws to drop, our breathing to quicken and maybe our heads to sway as we look with amazement. AETI's Advanced Flight Control System II is just such an item, a flight controller that greatly impressed us through hours of testing. This is no-compromise hardware and will so elevate your simulation experiences you may need someone to haul you off to bed, work, or whatever you might be late for.

Just so we are not accused of leading anyone astray, let's bring out the bad news - please sit down for a moment before you try this on - you will need to conjure up around £400 (\$495.00 if you live in the USA) to own one of these. But our opinion is, you won't regret it. If you haven't fainted from the shock, let's

Pro Pedals

Manufacturer: CH Products
Web: www.chproducts.com
Price: £89.95 (in UK), \$83.00 (in USA)

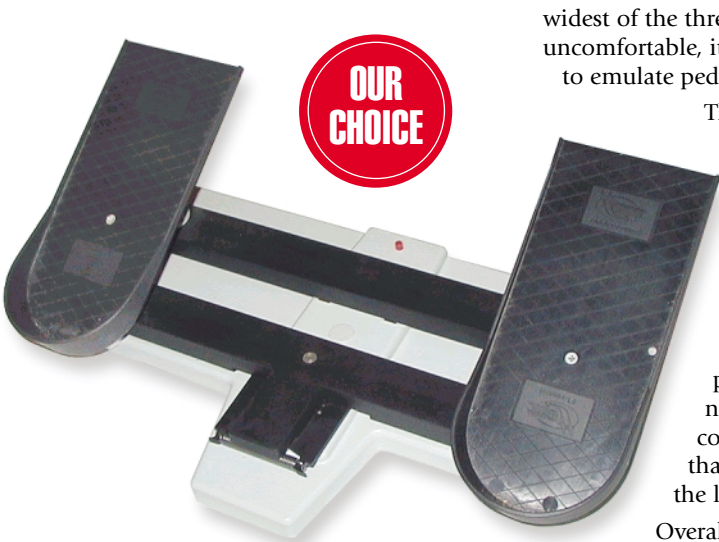
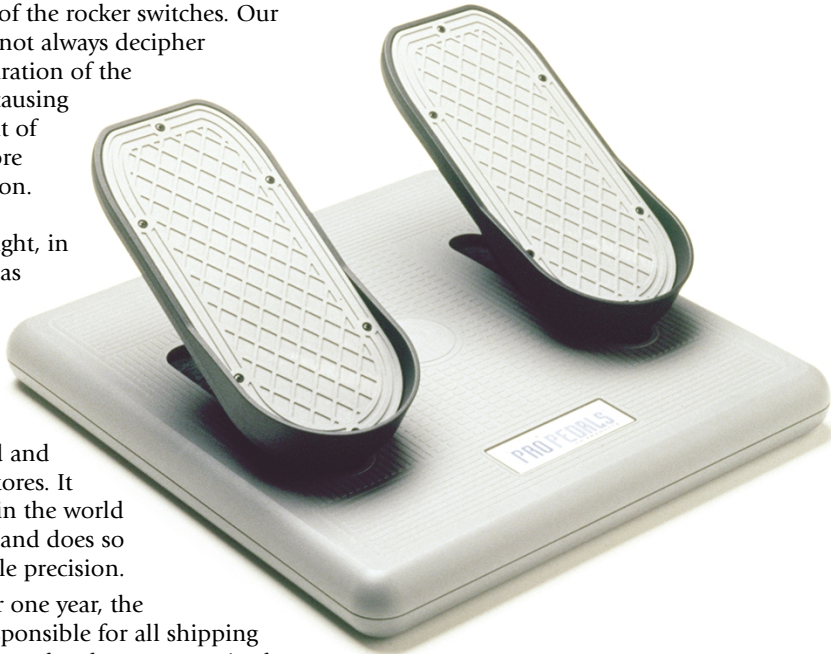
A companion to the Flight Sim Yoke PC, the Pro Pedals have value as their main virtue. Simple, easy installation, and compatibility with several other controllers make this a popular choice for simmers.

The Pro Pedals' small and nearly square base won't gobble up too much floor space, and plugs right into your PC's soundcard gameport. Whilst saving floor space might be good, the pedals centre-to-centre distance is quite short, only 8 inches. This causes one to hold his/her legs close together, which we found to be uncomfortable after 10 or 15 minutes of flight.

The pedals slide fore and aft within a pair of tracks, and can operate in both flying mode and racecar mode via a base-mounted switch. We noticed that with this type of arrangement the tracks collected dirt and grit over time, which resulted in a less than smooth operation and required a bit of maintenance.

The performance of the Pro's left a bit to be desired, often over-controlling aircraft regardless of the sensitivity settings, platform, or aircraft flown. This is the area in assessing controllers that truly separates the average from the excellent.

While being the least expensive of the bunch, these pedals could stand some refinement, even if it meant a higher price.



Simped Vario Pedals

Manufacturer: Hofmann Electronic
Web: www.simmart.com/hardware/simped
Price: approx. £100 (in UK) or \$149.00 (in USA)

The Simped Vario Pedals provide an excellent option for flight simmers looking to enhance their flight decks. At around £100 (\$149.00), they are the middle choice in this roundup and appear to be the best choice overall.

Our test unit necessitated that some assembly skills be used, but relatively simple. Mount the pedals in one of two configurations (one for flying, one for racing), program the cable according to the instructions and plug it into your gameport. No drivers are needed, so you're ready to fly within minutes.

During the initial correspondence with Simped, they enquired about the controller which we would use for testing. At the time it was Microsoft's Precision Pro joystick, so Mr. Hoffman included a neat device that disables the rudder function of the stick, transferring control to the pedals. This worked flawlessly and we enjoyed, for the very first time, rudder pedals mated to the Precision Pro. This was especially appreciated while flying in Warbirds and Combat Flight Simulator.

Pedal movement is very smooth, and differs from the CH Pro Pedals in that the footrests are mounted to a pair of pivoting bars. The tension spring is conveniently located in plain view and is extremely easy to customise. One can add rubber bands to increase the resistance or simply change the spring.

We found the distance from pedal centres to be approximately 14", the

widest of the three. While not uncomfortable, it seemed a bit too wide to emulate pedals in the real world.

The pedal's platform is quite stable, but we recommend securing it with the provided hook and loop fasteners or any method that works in your space.

Performance of the pedals was excellent; we noticed increased yaw control at our command than was demonstrated by the lower priced Pro Pedals.

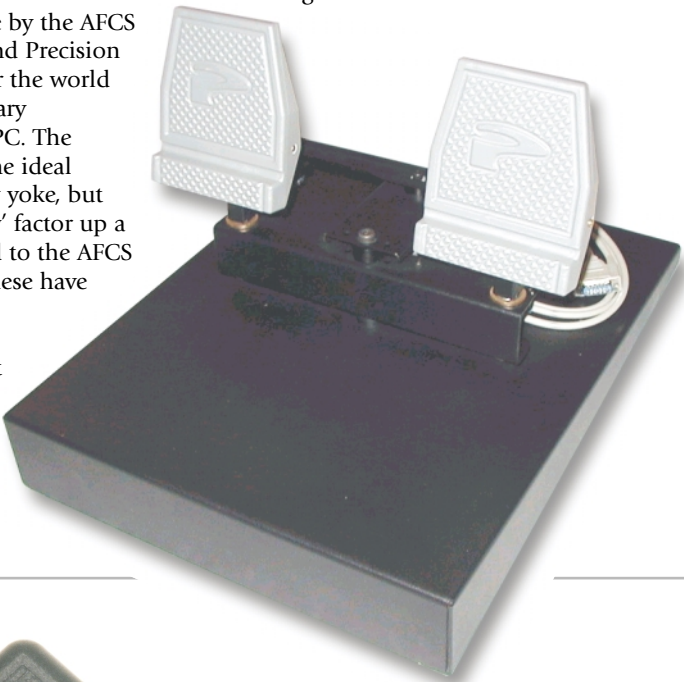
Overall our top pick of the three, given all the factors.

Cirrus Pedals

Manufacturer: AETI
Web: www.simpilot.com
Price: approx. £250 or \$ 395.00

Not to be out done by the AFCS flight yoke, AETI and Precision Flight Control offer the world another extraordinary peripheral for the PC. The Cirrus Pedals are the ideal companion for any yoke, but will bring the 'wow' factor up a level when coupled to the AFCS II. Like the yoke, these have the most authentic appearance in the group and are built for a lifetime of enjoyment.

The pedals themselves are synthetic, but the



mechanism and base is either steel or aluminium. The pedals pivot about a bar and offer nearly twice the resistance of the Simped Vario pedals. They felt just like the real thing.

The base measures 16" wide and 19.5" deep and provides a solid surface for your heels to rest upon. It comes equipped with two strips of Velcro to bite into your carpet. These performed nicely, never allowing the base to slide even with the hardest push.

For the price, one expects fantastic performance and the Cirrus Pedals deliver the goods. With a 10.5" centre-to-centre distance, these were comfortable through hours of flying and the steeper angle of the pedals was preferred over the lower tilt of the others. Aircraft control improvements can be felt instantly over the lower priced models.

The quality of the pedals is unsurpassed, but at around £250 (\$395), they left us wondering just how important rudder pedals are in the overall scheme of PC flight simulation.

Pro Throttle

Manufacturer: CH Products
Web: www.chproducts.com
Price: £99.95 (in UK), \$95.00 (in USA)

Standing alone in the scheme of game controllers is the venerable CH Pro Throttle. This joystick sidekick can add an almost endless number of programmable buttons, more precise throttle control, and a bit more of that 'jet' feel to your PC flying experience.

The Pro Throttle plugs into both your keyboard port and depending on what other controllers you have, directly into your gameport. Or, if you own the CH Pro Pedals, into a supplied Y-connector. Your joystick/yoke cable connects to a port on the throttle itself. Programming of the buttons is accomplished with the 'Speedkeys' software provided on the included CD, although it was somewhat tricky to get

the commands to be carried out accurately. CH provided us with excellent support during our learning curve, and soon we had so many commands at our disposal we considered labelling the handle! Movement of the throttle is very smooth, but especially noticeable were the improvements in engine control. Standard throttle levers seem to be extra sensitive, causing one to constantly

'search' for that perfect spot. The Pro Throttle has a 3-inch slot that it slides through, which apparently is what supplies us with this superb control. The addition of the Pro Throttle to both the Flight Sim Yoke PC and the Force FX joystick was an excellent enhancement. Recommended for anyone tired of the toy-like throttles most controllers come with.

Greg Gott

	FlightSim Yoke (PC)	AFC5 II	Pro Pedals	Simped Vario Pedals	Cirrus Pedals	Pro Throttle
	CH Products	AETI	CH Products	Hoffmann Co	AETI	CH Products
USB Port	No	Yes	Yes	Yes	No	No
Installation	4	5	5	4	5	3
Ergonomics	4	5	3	4	5	3
Performance	3	5	3	4	5	5
Button Layout	5	4	NA	NA	NA	4
Warranty	3 years	1 year	3 years	6 months	1 year	3 years
Price	£89.95	£400 (approx.)	£89.95	£100 (approx.)	£250 (approx.)	£99.95
PC Pilot Rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★

HARDWARE TIPS AND TRICKS

Updating Your Video Drivers

During the Flight Simulation Exhibition in Birmingham last December we met a gentleman who requested that we write about installing video card drivers. We always try to keep our promises at PC Pilot! Driver upgrades can sometimes be a pain in the neck, so let's explore some methods that seem to work consistently. Drivers normally are downloaded as executables (.exe) or in Zip (compressed) format. The .exe installation can be installed in one of two ways, while the Zip file usually requires a manual install. First of all you will need to locate the website of the your video card manufacturer or the chip maker (eg. 3dfx and TNT chips are used in a variety of different named cards). One-stop driver shopping can be found at the following website: www.3dfiles.com/drivers/ To download a file, first be sure to locate the proper driver build for your product. Left click on the file, and then choose 'Save this file to disk'. You must then select a location on your hard drive to

download the file to (it can be anywhere, as long as you make note of it!). Once you've selected the location, click 'Save' and the download should begin. .EXE FILE Simply run (double click) the '.exe' and normally it will self-install the drivers and any control panel applications. Reboot your computer and everything should be fine. ZIP FILES (AND SOME .EXE) This method may seem a bit more time consuming, but it offers more control over exactly what goes in and what doesn't. This method can often be used with both .exe and .zip files. a) Using WinZip or any suitable decompressing program, extract the contents of your .exe or .zip into a folder of your choice. Some people keep a folder on their C:\ drive named 'Drivers' which they use to store several driver builds (within their own folder) that they may want to experiment with later.

In this example, let's say we unzipped the drivers into a folder named 'TNT2' that is located within the C:\Drivers\ folder. b) From your Windows Desktop, go to Start/Settings/Control Panel/Display/Settings/Advanced/Adapter/ and then click on the 'Change' button. You will see a window called 'Update Device Driver Wizard', then click next. c) Select 'Display a list of all drivers...' d) Select 'Show Compatible Hardware' and click on 'Have Disk'. e) From this window (Install from Disk') click on 'Browse'; before you are 4 boxes, one of which contains your hard drive's folders. Using your mouse, click your way to the folder that contains the drivers, in our example C:\Drivers\TNT2\. Notice that Windows is looking for an ".inf" file and once you have browsed to it, that file will appear in the left-hand window. Click OK and Windows will install the drivers. Reboot your PC and enjoy (hopefully) better performance!

COMPETITION

Win a complete control system, courtesy of CH Products!

Plus three fabulous runner-up prizes!

1st PRIZE:

Win a first prize of a CH Flight Sim Yoke LE and Pro Pedals. Both have USB connectors and will make a fantastic addition to your simulation experience.

RUNNER-UP PRIZES:

If you are a runner up you could win one of the following great USB controllers: F16 Combatstick, Gamestick 3D or CH Gamepad

HOW TO ENTER:

All you have to do is to correctly answer the following three questions: 1) What does CH Products build on its second floor? 2) What did CH Products win at the 99 Oshkosh Show in 1999? 3) What plane did the owner of CH Products build in 1999? If you think that only the CEO of CH Products knows the answers then you'll need to do some research... we didn't say it would be easy! All the correct answers can be found on the CH Products web site at www.chproducts.com Please send in your answers on a postcard or on the back of an envelope to:

CH Products Competition,
PC Pilot Magazine Ltd,
PO Box 3002,
Brighton, BN2 2BZ
United Kingdom

Please make sure you clearly state your full address, e-mail address if you have one and telephone number. Competition closes 10th March 2000. Entries received after that date will not be included. Prizes will be drawn at random from correct answers.



CH Flight Sim Yoke LE



Pro Pedals



F16 Combatstick



CH Gamepad



Gamestick 3D

Great Flight Sim Downloads!

Shop for a box? No, get it for FREE!

What's the point of purchasing software when you can download products to add to your flight simulator for absolutely nothing? "No such thing as a free lunch", we hear you say. Read on and find out what you're missing out on!

Freeware authors are people who make add-ons to various flight simulators for themselves and then kindly upload them to the Internet for others to use for free! This is a very popular part of the flight simulation scene and one that makes expandable products such as Microsoft Flight Simulator and Fly! so popular.

There are many great Freeware downloads to be found on the Internet produced to a standard comparable to, if not better than, some commercial software you will find in the shops. To be fair to the commercial publishers, some downloads aren't worth the time of day, but some are excellent.

Before we tell you what we think are the best free products to be had, we would like to give you a few simple tips to help you get the best downloads available...

1) Pick a download site that checks files before uploading them to the Internet for you to download. This is very important because it has been known for some sites to inadvertently provide files that are corrupt or full of viruses.



2) Check that you know what the file size is before starting the download. Some sites provide the information in a form of '26104Kb' or simply (26.1mb). Be careful of web sites that do not provide this information as you could literally spend hours downloading a single file. A quick guideline if you have a 56k modem is that for every 1000kb (1Mb) allow 20 minutes.



3) If a 'Readme' file (a small '.txt' or text document) is available to read prior to download, always read it for installation guidelines and to get a feel of the designer or product. You can find out much from a 'Readme'. Check that it has the following included in it:

- ✓ Does the author know what he is talking about?
- ✓ Does he give accreditation to other people's copyrighted work?
- ✓ Does he have a web site you can visit for more information?
- ✓ Does it include installation instructions?
- ✓ Is there contact information for technical support (e-mail address)?
- ✓ Is the download compatible with your system or flight simulator?
- ✓ Do you need to download other files to be able to use it?
- ✓ What is the file size? You don't want to spend hours downloading a lousy product do you?

If the person or team who created the file has not provided at least half of this information, we recommend that you do not download it. If he/she cannot be bothered to write a few simple instructions then he/she has probably also taken shortcuts elsewhere.

A common question we get asked at PC Pilot is, "How are large files transmitted over the Internet". The most common way is for programmers and designers to bundle their program files together in one compressed file called a Zip.



This file, when executed, extracts or un-compresses the integrated files into directories chosen by the user. Some zip files are specially formatted to extract automatically to the correct folders. This is great for novices because it's simply a case of clicking the 'Extract' button and the rest is done for you. You will need a program like Winzip (www.winzip.com) to be able to use these types of compressed files. (There is a trial version of Winzip on the cover CD-ROM that came with Issue 2.



Programmers usually employ these types of file when crucial changes to your system are needed. These files are like Zips in that they have compressed files within them. The only difference being that they also modify settings in the simulation program or Windows after it has copied the files to the corresponding directories.

Where do I start from?

Now we have found out how to download and install Freeware files, let's take a look at some of the reliable places you can get them from. These are just a pick from our favourites – of course there are many more than the ones listed here below.

The first one, and probably the most established is [Flightsim.com](http://www.flightsim.com) - [http://www.flightsim.com/cgi/kds?\\$/main/search.htm](http://www.flightsim.com/cgi/kds?$/main/search.htm)

This has an absolutely enormous warehouse of files that include adventures, aircraft, flight plans, gauges, panels, scenery, sounds, utilities and miscellaneous items for Flight Simulator 95, 98, 2000 and of course other simulators.



The next is Avsim Online. Their file library is at <http://www.avsim.com/library>

Again, you can search their mammoth catalogue of files but you can only view by category or year, which can be tiresome.

Compuflight <http://www.compuflight.com> is an up and coming, yet colossal, resource that collects its files from all over the world. Compuflight only describes files in text format and does not provide images.

Beware! These are the top three web sites that we feel you will be able to get your first fix of downloads. Be careful as we are sure once you start you won't be able to stop!

What are the best free files on the Net?

There are literally thousands of Freeware files on the Internet to download. The most common are aircraft, panels, scenery and utilities such as flight planners for simulators such as Microsoft Flight Simulator. On the following pages are a few of the best files we found on the Internet. Our thanks go to Mike Hambly (legendary freeware and commercial simulation sound engineer) for his help in compiling this list. ■

Mike Clark

Aircraft

Platform	Name	FileName	Description	Author	Hyperlink (web site Address)
FS98	Convair B-58 Hustler. T	FSDB58-1.zip	Features a unique paint scheme, accurate panels, sounds, landing lights, full array of moving parts as well as a fully tested FDE.	Jim Goldman, Robert Kirkland, Gerry Schmidt, Alex Bashkatov, Mike Hambly and Larry Teele of FlightSim Developers	http://www.flightsim.com/cgi/kdl/main/18/fsdb58-1.zip?gXCa1009
FS98	Douglas C-133a Cargomaster	c133fsd1.zip	Features a unique paint scheme, panels, sounds, landing lights, full array of moving parts as well as a fully tested FDE.	Gerry Schmidt, Jim Goldman, Larry Teele, Robert Kirkland, Alex Bashkatov and Mike Hambly of FlightSim Developers (FSD)	http://www.flightsim.com/cgi/kdl/main/18/c133fsd1.zip?gXCa1009
2000 / FS98	DC3 Panel and Plane	WJRDC3a3.zip WJRDC3b3.zip	Features a unique paint scheme, panels, sounds, landing lights, full array of moving parts as well as a fully tested FDE. 2 files to download.	Bill Rambow, Roy Chaffin and Jan Visser	http://www.flightsim.com/cgi/kdl/main/18/wjrdc3a3.zip?gXCa1009 http://www.flightsim.com/cgi/kdl/main/18/wjrdc3b3.zip?gXCa1009
FS 2000	Lufthansa Airbus A340-300	343lh2k.zip	Features maximum moving parts, maximum 3D parts, maximum textures, AF99 circle, 12 sided fuselage and engines. Night lighting.	Camil Valiquette	http://pages.infinet.net/camsim
FS 2000	Boeing 737-400 & Panel	x737fs2k.zip	Includes a full aircraft container with a repainted B737-400 in Southwest livery. Modified MDL file. Will not interfere with your default 737 textures.	Jorge Alsina	http://www.flightsim.com/cgi/kdl/main/32/x737fs2k.zip?gXCa1009
FS98	Roll-Out Colours Boeing 757	b752bng98.zip	This is a repaint of Brian Quayle's superb Boeing 757-220 in Boeing's Roll Out livery.	Brian Quayle & Chris van Bijlert	http://www.avsim.com/cgi-bin/library/jump.cgi?ID=1153
FS98	DC-9-51 Panel & Plane	dc9v40pl_pn.zip	Includes nite-lighted windows, detailed paint scheme on all areas and now includes moving parts.	Mike Vidal & David Durst	http://www.avsim.com/cgi-bin/library/jump.cgi?ID=2471
FS 2000	Bell 47G Helicopter	b47g_mlc.zip	Bell 47G with panel, sounds & animated rotors. This is a beautiful rendition of the Bell 47G. Great to fly. Excellent!	Monte L. Caudill	http://members.aol.com/keith777/helipad.html
FS 2000 / FS98	FedEx McDonell Douglas DC-10-30F	fedex-dc10.zip	Features moving parts, and AF99 12-sided fuselage and engines.	Gary Carlson and Bill Alderson Textures by: The Freeware Works	http://freewareworks.hypermart.net/
FS98	Piper Seneca	fsd_n95d.zip	Moving Parts Piper Seneca V N95D - Flight dynamics tested by her actual pilot Peter Sidoli. Includes panel and sound files.	Peter Sidoli and Graham Waterfield	http://www.flightsim.com/cgi/kdl/main/18/fsd_n95d.zip?gXCa1009

Multiplayer

Platform	Name	FileName	Description	Author	Hyperlink (web site Address)
FS98	SquawkBox Full Install Release 2.1.2	sb212.zip	Full Install Release 2.1.2 which enables you to communicate with ground ATC over the SATNET system. In order to use this free system, you must be a registered pilot with SATCO (see http://www.satco.org)	Joe Jurecka	http://www.avsim.com/cgi-bin/library/jump.cgi?ID=400

Scenery

Platform	Name	FileName	Description	Author	Hyperlink (web site Address)
FS98	Photoreal Cloud Textures	cloud.zip	This file replaces the clouds texture (clouds.r8) and the cumulonimbus texture (stormy.r8)	Dr. Michitaka Suzuki	http://homepage1.nifty.com/te xmsfs/cloud.zip
FS 2000	FS2000 street textures	New Road.zip	FS2000 Street Textures. Changes the boring stock road textures to standard striped street markings	David Giles	http://www.flightsim.com/cgi/kdl/main/33/new_road.zip?gXC a1009
FS98	Night Lighting Textures	nitelit.zip	Edited textures to give a more realistic view of cities at night.	Isa1873@aol.com	http://www.flightsim.com/cgi/kdl/main/19/nitelit.zip?gXC a1009
Fly!	Fly! Grand Canyon Satellite Scenery	gcsat.zip	Scenery covers most of the Grand Canyon, the KGCN airport and Tusayan, AZ, the town near the south rim. It was created using 16-meter satellite images.	Todd Klaus	http://www.flightsim.com/cgi/kdl/main/28/gcsat.zip?gXC a1009
FS98	Seattle Tacoma Int'l Airport	seatacv1.zip	Scenery has every gate, airlines placed in the correct spots, and accurately placed taxiway lines. The base texture is a satellite photo.	Tim Zacher	http://www.flightsim.com/cgi/kdl/main/19/seatacv1.zip?gXC a1009
FS98	Bahamas	bahmas11.zip	Scenery for the Bahamas, Turks and Caicos islands Improvements to Freeport and Nassau Int'l airports.	John Valley	http://www.flightsim.com/cgi/kdl/main/19/bahmas11.zip?gXC a1009
FS 2000	London 2000	london2k.zip	Includes Piccadilly Circus, Regent Street, Covent Garden, Marble Arch, Wellington Arch, Natural History Museum and Kew Gardens.	Reiffer Bros	http://www.magrathea.clara.net/download/london2k.zip
Fly!	Flytex	flytex2.zip	Revised textures for Fly! (asphalt/cement runway, taxiway, landing light, taxiway lighting).	Michael E Smith	http://www.avsim.com/cgi-bin/library/jump.cgi?ID=2656
FS 2000	Santa Catalina	sci102.exe	Photoreal FS2000 scenery from one of the worlds best scenery designers, Justin Tyme. A fantastic piece of scenery for FS2000.	Justin Tyme	http://members.xoom.com/fsg enesis/sci102.exe

Aircraft Panels

Platform	Name	FileName	Description	Author	Hyperlink (web site Address)
FS 2000	Boeing 777-200 Panel	b777pn2k.zip	Adds gear wind sounds, altitude callouts, radio altimeter, passenger signs, pushback gauges. All instruments visible on same screen.	Michael Toussaint	http://www.flightsim.com/cgi/kdl/main/32/b777pn2k.zip?gXC a1009
FS98	Airbus A330 Panel	33zero.zip	Features left seat setup, zero-gauge full-flight deck view, panel incorporating FPDA altitude callouts, undercarriage rumble sounds and switch clicks with ACS GPS98 and a real CRT navigation display.	Vanessa Leightower	http://www.flightsim.com/cgi/kdl/main/21/33zero.zip?gXC a1009

FS98	AV-8B Harrier Panel	av8bpnl.zip	A splendid Harrier panel, beautifully rendered and highly visual. Nice instrumentation.	Phil Perrot	http://www.alphasim.co.uk/downloads/av8bpnl.zip
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Utilities

Platform	Name	FileName	Description	Author	Hyperlink (web site Address)
FS98	Pushback Gauge	fpdapush.zip	Hear communications with ground and you will be pushed back.	Andreas Jaros (with help from Konstantin Prokopiu, Jan Profe-Bracht & Uwe Kress).	http://www.flightsim.com/cgi/kdl/main/25/fpdapush.zip?gXC a1009
FS98/FS2000/Fly!/CFS/ALL	Go!Zilla for Win95/98/NT	gozilla.exe	Broken downloads resumed, can be programmed to download whilst you sleep. Saves time and money. Stops all downloads and disconnects from the internet.	Gozilla.com	http://www.gozilla.com/gozilla/download.html
CFS	CFS Mission Editor	cfsme.zip	Create missions anywhere in the world using CFS screenshot maps. It operates directly on the mission.mis files and so is able to edit existing mission files. You can even run it at the same time as CFS.	Keith Bedford	ftp://ftp.telefragged.com/cfs/Utilities/cfsme.zip
FS98	GPWS98 V8.0	gpws98.zip ctratc.zip fltcrw.zip advstr01.zip aplc125.zip	Realistic warning sounds and systems. Includes autopilot and radio utilities/keys. Although GPWS98 is not an Adventure, an 'adv'-file is used to add these systems to Flight Simulator 98.	Wilco Van Deijl	http://flightsimmers.net/gpws/
FS98	Visual Object Designer	VOD30-1.ZIP VOD30-2.ZIP VOD3A.ZIP VODTEX30.ZIP	Will let you add 3 dimensional objects to FS98. Buildings, fuel trucks and other static objects can be incorporated into scenery by utilising thousands of macros (objects) found at the author's site.	Rafael Sanchez	http://flightsimmers.net/scenery/down.htm
FS98	Dynamic Object Designer	DOD3.ZIP DOD3A.ZIP	One of the first utilities to enable users to add dynamic aircraft and other objects to Flight Simulator 98.	Rafael Sanchez	http://flightsimmers.net/scenery/down.htm
FS98	Addit! Pro	ap98v315.zip	Manage and remove adventures, aircraft, panels, scenery, situations, sounds, textures and videos. Archive add-ons you are not using. Modify aircraft, panels and sounds. Add scenery to Flight Simulator 98's scenery library. Import add-on feature and more! Requires FS98, FS Converter 98.	Joseph Stearns	http://www.avsim.com/cgi-bin/library/jump.cgi?ID=2792
FS98	FlightZip Version 2.0	fltzip20.zip	FlightZip extracts ZIP files containing aircraft's, panels, sounds, scenery and adventures for FS98, and install the files in the correct directories.	Arnt Helge Haaland	http://www.avsim.com/cgi-bin/library/jump.cgi?ID=2932
FS98	FSNavigator 3.0	fsnav300.zip	Create detailed flight plans and patch them into your autopilot in FS98. A moving map is included that plots your route along your flight path in real time.	Helge Schroeder	http://www.fstools.simflight.de/

Sounds

Platform	Name	FileName	Description	Author	Hyperlink (web site Address)
FS 2000	Boeing 747 Complete Sound Set	b747ssa.zip b747ssb.zip	Default files are included with new engine sounds for flaps, touchdown and some start/shutdown procedures. Fully resampled and converted to ADPCM Wav format to save disk space.	Mike Hambly and Peter James (beta tester)	http://www.flightsim.com/cgi/kdl/main/31/b747ssa.zip?gXC a1009 http://www.flightsim.com/cgi/kdl/main/31/b747ssb.zip?gXC a1009

Product Listings

Back by popular demand, we round up the current simulators, add-ons, and other hardware and software.

We have also provided a general guide to Flight Simulator 2000 compatibility on most current commercial add-ons. Our guide is based on both our own experience and from details supplied by publishers and developers – please do use it as a guide and not as an absolute guarantee! As always, if in doubt talk or e-mail the publisher before purchase to clarify any concerns.

STANDALONE SIMULATIONS				
Developer	Publisher/Distributor	Product	Price (RRP)	PC Pilot Rating
Xavius	RC Simulations	Air Traffic Control Centre	£TBC	Await Review
Digital Integration	Titus	F/A 18	£34.99	3
SSI	Mindscape	Flanker 2.0	£34.99	4
Looking Glass	Electronic Arts	Flight Unlimited 3	£34.95	4
TRI	Take 2	Fly!	£34.95	3
Wilco	Associates	Hangsim	£29.95	4
Digital Aviation	Due year 2000	Light Aircraft Simulator 6	£TBC	Not Released
Microsoft	Microsoft	Microsoft Combat Simulator	£39.99	4
Microsoft	Microsoft	Microsoft Flight Simulator 98	£39.99	4
Microsoft	Microsoft	Microsoft FS2000 (Professional)	£69.95	4
Microsoft	Microsoft	Microsoft FS2000 (Standard)	£49.95	4
Oddsoft	Oddsoft	Rant 200	£89.95	Await Review
Apollo	RC Simulations	Tower Controller	£44.95	Await Review
Janes	Electronic Arts	USAF	£39.99	4
Laminar Research	Laminar Research	Xplane	£109.95	4


COMBAT FLIGHT SIMULATOR ADD-ONS				
Developer	Publisher/Distributor	Product	Price (RRP)	PC Pilot Rating
Abacus	Contact Sales	Aircraft Animator	£29.99	4
Combat Zone	Associates	Combat Pilot No.1 (Attack) Sqd.	£19.99	4
Abacus	Contact Sales	Flight Deck Blue Angels	£29.99	3
Wilco	Associates	Grand Canyon Scenery	£24.99	4
Combat Zone	Associates	Pacific Combat Pilot	£24.95	4
Abacus	Contact Sales	Pacific Theatre Aircraft	£29.99	4
Mailsoft	RC Simulations	Swiss Military 2000	£29.95	Await Review
Associates	Associates	The Luftwaffe Collection	£24.99	5
Abacus	Contact Sales	Tuskagee Fighters	£TBC	Not Released
Abacus	Contact Sales	Wings Over China	£29.99	3

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The Product Listings section is kindly sponsored by RC Simulations, the UK's leading supplier of flight simulation equipment and software. RC are one of the oldest established flight sim companies and offer a friendly, expert service. They are able to supply any of the products listed here to anywhere in the world – often at a discount to the price seen above. So if you are looking for the latest release or a hard-to-find piece of hardware, give them a call!

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JOYSTICKS AND THROTTLES			
Product	Manufacturer	Price (RRP)	
CH Flightstick PC	Virtual Reality	£29.95	
CH Mach 1 Joystick PC	Virtual Reality	£19.95	
CH Mach 1 Plus Joystick PC	Virtual Reality	£24.95	
CH Mach 3 Joystick PC	Virtual Reality	£34.95	
CH Jetstick PC	Virtual Reality	£19.95	
CH Gamestick PC Analogue	Virtual Reality	£34.95	
CH Gamestick 3D USB	Virtual Reality	£59.95	
CH F16 Flight Stick PC	Virtual Reality	£24.95	
CH F16 Combat Stick PC	Virtual Reality	£76.95	
CH F16 Fighter Stick PC	Virtual Reality	£119.95	
CH F16 Fighter Stick USB	Virtual Reality	£TBA	Due Summer 2000
CH Force FX (Force Feedback Joystick)	Virtual Reality	£129.95	
CH USB F16 Combatstick	Virtual Reality	£99.95	
CH Pro Throttle USB	Virtual Reality	£TBA	Due Summer 2000
CH Pro Throttle PC	Virtual Reality	£119.95	
CH Gamepad USB (Clear or Black)	Virtual Reality	£36.95	
CH Joystick Switchbox PC	Virtual Reality	£32.95	
CH Gamecard GC3 (PC)	Virtual Reality	£34.95	
CH Trackball Pro (PS2 or Serial)	Virtual Reality	£89.95	
CH X Cable (PC Extension Cable)	Virtual Reality	£11.95	
CH EXL500 Race System	Virtual Reality	£71.95	
Cyborg 2000 Joystick	Saitek	£39.99	
Cyborg 3D Stick	Saitek	£49.95	
ACM Game Card PC	Thrustmaster	£29.99	
Cyborg 3D Stick USB PC	Saitek	£49.99	

PEDALS			
Product	Manufacturer	Price (RRP)	
CH Pro Rudder Pedals PC	Virtual Reality	£99.95	
CH Pedals	Virtual Reality	£53.95	
CH Pro Rudders USB	Virtual Reality	TBA	
CH Pedals USB	Virtual Reality	TBA	
MRVC Rudder Pedals	RC Simulations	£119.95	
Cirrus Rudder Pedal Set PC	Precision Flight Controls	\$384.99	
SIMPED-Vario Pedals PC	Hofmann Electronics	\$139.99	

FLIGHT SIMULATOR ADD-ONS					
Developer	Publisher/Distributor	Product	Flight Simulator Compatibility	Price (RRP)	PC Pilot Rating
Data Becker	Data Becker	747	FS98 only	£19.99	2
AETI	RC Simulations	737 Aircraft & Panel	FS98. Partial FS2000	£14.99	2
Flight One	Associates	747-400 Jumbo	FS98 and FS2000	£19.99	3
Associates	Associates	Aces High	FS98 only	£24.99	3
Apollo	RC Simulations	Adventure 2000	FS98 only	£39.99	3
Data Becker	Data Becker	African Safari Scenery	FS98 only	£19.99	2
Pilots	Associates	Airbus 2000	FS98 and FS2000	£24.99	3
Abacus	Contact Sales	Aircraft Animator	FS98 and FS2000	£29.95	4
Abacus	Contact Sales	Aircraft Factory 99	FS98 and FS2000	£34.99	3
Aerosoft	Associates	Airline Adventures	FS98 only	£9.99	2
Aerosoft	Associates	Airline Flights 2	FS98 only	£29.99	2
Abacus	Contact Sales	Airport & Scenery Designer V2.0	FS98 and FS2000	£34.99	3
Wilco	Associates	Airport 2000 Volume 1	FS98 only	£29.99	4
Associates	Associates	Airport 2000 Volume 2	FS98 and FS2000	£29.95	Not Released
Mailsoft	RC Simulations	Airport Zurich-Kloten	FS98. Partial FS2000	£29.95	Not Rated
Associates	Associates	Australia Scenery	FS98. Partial FS2000	£19.99	2
Mailsoft	RC Simulations	Balaeric Islands Scenery	FS98. Partial FS2000	£29.95	Not Rated
Aerosoft	RC Simulations	Berlin 2000	FS98 and FS2000	£TBC	3
Aerosoft	Associates	California Adventure Collection	FS98 only	£24.99	3
Lago	Associates	Cleared to Land	FS98. Partial FS2000	£19.99	3
Abacus	Contact Sales	Co Pilot 2	FS98 and FS2000	£34.99	3
Associates	Associates	Concorde SST	FS98. Partial FS2000	£24.99	4
Abacus	Contact Sales	Custom Panel Designer	FS98 and FS2000	£29.99	3
Abacus	Contact Sales	Dangerous Airports	FS98 and FS2000	£29.99	3
Associates	Associates	DC-3	FS98. Partial FS2000	£9.99	4
Papa Tango	Papa Tango	EFIS'98	FS98 only	£39.99	4
VIP	Associates	Electra!	FS98. Partial FS2000	£29.99	3
Alting	Associates	Europe 1 Pro	FS98. Partial FS2000	£34.99	3
Associates	Associates	Europe 2000	FS2000 only	£TBC	Not Released
Alting	Associates	Europe 3 (England & Wales)	FS98. Partial FS2000	£29.99	3
Associates	Associates	Final Approach	FS2000	£29.95	Not Released
Apollo	RC Simulations	First Class Boeing 747-400 Glass Cockpit	FS98 only	£34.99	3
Papa Tango	Papa Tango	Flight Academy	FS98. Partial FS2000	£34.99	2
Abacus	Contact Sales	Flight Deck Blue Angels	FS98 and FS2000	£29.99	3
Flight One	Associates	Flight Director'99 Pro	FS98 only	£29.99	4
Papa Tango	Papa Tango	Fly Lauda	FS98 only	£34.95	2
Flight One	Associates	FS Clouds & Textures Pro	FS98 only	£29.99	4
Abacus	Contact Sales	FS Flightbag	FS98 and FS2000	£19.99	3
Lago	Lago	FS Traffic	FS98 and FS2000	£19.99	5
Flight One	Associates	FS Weather	FS98 only	£19.99	3
Aerosoft	Associates	German Airports 3	FS98 and FS2000	£24.99	4
Wilco	Associates	Grand Canyon Scenery	FS98. Partial FS2000	£24.99	4
Mailsoft	RC Simulations	Greece Scenery	FS98. Partial FS2000	£29.95	2
Flight Crew	Associates	Himalayas Scenery	FS98. Partial FS2000	£9.99	3
Instant Access	Associates	Hong Kong'99	FS98. Partial FS2000	£9.99	2
Technic Direct	RC Simulations	HQ Aircraft Collection 2	FS98. Partial FS2000	£29.99	3
Technic Direct	RC Simulations	HQ Aircraft Collection 98	FS98. Partial FS2000	£29.99	2
Mailsoft	RC Simulations	Hungary, Slovakia and Czech Republic	FS98. Partial FS2000	£29.95	3
Abacus	Contact Sales	Instant Airplane Maker	FS98 and FS2000	£29.99	4
Flight Crew	Associates	Japanese Aircraft Collection	FS98. Partial FS2000	£9.99	3
Flight One	Associates	Legendary Aircraft Collection/Suite	FS98 only	£19.99	4
Take 2	Take 2	Mayday! Mayday!	FS98 only	£24.99	2
AETI	RC Simulations	MD-83 Aircraft & Panel	FS98. Partial FS2000	£24.99	3
PC Aviator	RC Simulations	Megascenery Downunder	FS98. Partial FS2000	£39.95	3
PC Aviator	RC Simulations	Pacific Northwest Megascenery	FS98. Partial FS2000	£39.95	3
Instant Access	Associates	Perfect Flight Deluxe Great Britain/Ireland	FS98. Partial FS2000	£24.99	3
Pilots	RC Simulations	Pilots Russian Multimedia Collection	FS98. Partial FS2000	£9.95	3
Associates	Associates	Precision Pilot	All sims	£34.99	4
AETI	Associates	Proflight 2000	FS98 and FS2000	£34.99	Not Released
AETI	Associates	ProFlight 98	FS98 only	£34.99	5
Associates	Associates	RAF Collection	FS98. Partial FS2000	£24.99	3
Papa Tango	Papa Tango	Real ATC	FS98 only	£39.99	4
Associates	Associates	Royal Air Force 2000	FS98 and FS2000	£24.95	Not Released
Mailsoft	RC Simulations	Scandinavia	FS98. Partial FS2000	£29.95	3
Flight Crew	Associates	Scenery Venice	FS98. Partial FS2000	£9.99	3
Flight Crew	Associates	Scenery Vienna	FS98. Partial FS2000	£9.99	3
Jeppesen	Associates	SimCharts	All sims	£19.99-29.99	5
Data Becker	Data Becker	Special Air Mission	FS98	£19.99	2
Flight Crew	Associates	Sri Lanka Scenery	FS98. Partial FS2000	£9.99	2
Wilco	Associates	Tahiti Scenery	FS98. Partial FS2000	£24.99	3
AETI	RC Simulations	The Jet Age	FS98 only	£19.99	2
Associates	Associates	The Luftwaffe Collection	FS98 and FS2000	£24.99	5
AETI	RC Simulations	The Next Generation (Aircraft)	FS98 only	£14.99	3
Lago	Papa Tango	The Triangle	FS98 only	£34.99	4
FlightSoft	RC Simulations	Tribute to the DC-10	FS98. Partial FS2000	£29.99	3
Pilots	Associates	Tupulov TU-154	FS98. Partial FS2000	£19.99	2
Mailsoft	RC Simulations	Turkey & Cyprus	FS98. Partial FS2000	£29.95	2
VIP	Associates	VIP Classic Airliners	FS98. Partial FS2000	£24.99	4
VIP	Associates	VIP Classic Wings (vol 2)	FS98. Partial FS2000	£24.99	4
VIP	Associates	VIP Classic Wings 98	FS98. Partial FS2000	£19.99	4
VIP	Associates	VIP Ultimate Classic Wings	FS98. Partial FS2000	£29.99	4
Lago	Associates	Winplanner Plus	FS98 only	£34.99	3

FLIGHT YOKES			CONTROL PANELS & COCKPIT SYSTEMS		
Manufacturer	Distributor	Price (RRP)	Manufacturer	Distributor	Price (RRP)
CH USB Flight SimYoke (Three Levers)	Virtual Reality	£149.95	ACP Panel Compact	RC Simulations	£199.95
CH USB Flight SimYoke LE (One Lever)	Virtual Reality	£119.95	Optivision Visual Display System	RC Simulations	From £2999.95
CH Flight Sim Yoke PC (One Lever)	Virtual Reality	£104.95	Masterpilot Value Pack	RC Simulations	£39.95
AETI Yoke & Throttle	RC Simulations	£399.95	Pro Quality Fresnel Lense & Fittings	RC Simulations	£99.95

Glossary

The world of aviation seems blessed with a bewildering array of acronyms. We hope the following will prove a handy reference guide to some of the more widely used terms.

A

ACARS -Aircraft Communication Addressing and Reporting System.
ADF - Automatic Direction Finder/Finding.
ADI - Attitude Deviation Indicator.
ADR - Accident Data Recorder.
AFCs - Automatic Flight Control System (an advanced autopilot).
AFIS - Aerodrome Flight Information Service.
AGL - Above Ground Level.
AHRS - Attitude-Heading Reference System
AIS - Aeronautical Information Service. CAA unit based at London-Heathrow Airport, providing flight-planning services and information for pilots.
AIZ - Aerodrome Information Zone.
AOPA - Aircraft Owners and Pilots Association.
AP - Airport or Autopilot.
APP - Approach (control).
APU - Auxiliary Power Unit.
ASI - Airspeed Indicator.
ASR - Altimeter Setting Region.
ATC - Air Traffic Control.
ATIS - Automatic Terminal Information Service.

B

BRG - Bearing.

C

CAA - Civil Aviation Authority - the UK aviation regulatory organisation.
CAS - Calibrated Airspeed.
CAT - Clear-Air Turbulence.
CDI - Course Deviation Indicator.
CDU - Control Display Unit.
CH - Compass Heading.
CHT - Cylinder Head Temperature (a cockpit gauge).
C/L - Centre-Line (of a runway, for example).
Clouds -commonly-used abbreviations for cloud types:-
* AC - altocumulus
* AS - altostratus
* CB - cumulonimbus
* CC - cirrocumulus
* CI - cirrus
* CS - cirrostratus
* CU - cumulus
* NS - nimbo stratus
* SC - stratocumulus
* ST - stratus
CRT - Cathode Ray Tube (television monitor).
CRS - Course.
CSU - Constant-Speed Unit.
CTA - Control Area.
CTR - Control Zone.
CVR - Cockpit Voice Recorder.
CZ - Control Zone (USA).

D

DF - Direction-Finding.
DH - Decision Height.
DI - Direction Indicator.
DME - Distance-Measuring Equipment.

E

EADI - Electronic Attitude Director Indicator.
ECU - Environmental Control Unit.
EFAS - Electronic Flash Approach Light System.
EFIS - Electronic Flight Instrument System.
EGT - Exhaust Gas Temperature (a cockpit gauge).
EHSI - Electronic Horizontal Situation Indicator.
EICAS - Engine Indicating and Crew Alerting System.
ELT - Emergency Locator Transmitter.

F

FAA - Federal Aviation Administration, USA equivalent of UK CAA.
FADEC - Full-Authority Digital Engine Control.
FAF - Final Approach Fix.
FDR - Flight Data Recorder more popularly known as the 'black box'.
FL - Flight Level.
FMS - Flight Management System. Also referred to as FMC (Flight Management Computer)

G

GCA - Ground-Controlled Approach
GNSS - Global Navigation Satellite Systems.
GPS - Global Positioning System (Navstar).
GPWS - Ground Proximity Warning System.
GS - Glideslope.
G/S - Groundspeed.

H

HDG - Heading.
HF - High-Frequency band.
HSI - Horizontal Situation Indicator.
HUD - Head-Up Display.

I

IAS - Indicated Airspeed.
ICAO - International Civil Aviation Organisation (responsible for the codes for airports amongst other things).
IFCS - Integrated Flight Control System.
IFR - Instrument Flight Rules.
IGS - Instrument Guidance System.
ILS - Instrument Landing System.
INS - Inertial Navigation System.
IR - Instrument Rating.
ISA - International Standard Atmosphere.
ITT - Inter-Turbine Temperature.

K

KHz - Kiloherzt.
Kt - **Knot** - one nautical mile per hour. One knot equals 1.1515 mph.
kW - Kilowatt.

L

LARS - Lower Airspace Radar Advisory Service.
LAT - Latitude.
LDA - Landing Distance Available.
LF - Low Frequency - radio waves with frequencies in the 30-300 kHz band.
LITAS - Low-Intensity Two-colour Approach System.
LOC - Localizer.
LON(G) - Longitude.

M

M or MAG -Magnetic.
Mach - Ratio of true airspeed to the speed of sound. Mach 1 = 1,100 feet per second or 760 mph.
MAP - Missed Approach Point.
MB - Millibar.
MDA - Minimum Descent Altitude.
MDH - Minimum Descent Height (above ground level).
MET - Meteorology, weather.
METAR - Coded aerodrome MET report.
MF - Medium Frequency.
MFD - Multi-Function Display.

MH - Magnetic Heading.
MHz - Megahertz.
MLS - Microwave Landing System.
MSA - Minimum Safe Altitude.
MSL - Mean Sea Level
MTOW -Maximum Take Off Weight (less total usable fuel in applicable aircraft).

N

NATS - National Air Traffic Services.
NDB - Non- Directional Beacon.
NM - Nautical Mile.
NOTAM - Notices to Airmen.

O

OAT - Outside Air Temperature.
OBS - Omni-Bearing Selector, used to select the radial from a VOR.

P

PAPI - Precision Approach Path Indicator.
PAR - Precision Approach Radar.
PIC - Pilot-In-Command.
PIO - Pilot-Induced Oscillation.
PLN - Flight-Plan.
PMS - Performance Management System.
POB - Persons On Board. See also SOB.
POH - Pilot's Operating Handbook, an aircraft's 'owner's manual'.

Pooley's - Flight guide to the United Kingdom and Ireland, published annually.
PPL - Private Pilot's Licence.
PTT - Press-To-Transmit.

Q

ODM - Magnetic bearing to a direction-finding station.
ODR - Magnetic bearing from the station.
QFE - Atmospheric pressure at aerodrome elevation.
OFU - Magnetic orientation of runway in use.
QNE - Reading in feet on an altimeter set to 1013.
QNH - Altitude above mean sea level based on local station pressure.
QTE - True line of position from a direction-finding station.
QUJ - True bearing.

R

RAS - Radar Advisory Service.
RCL - Runway Centre-Line.
RBI - Relative Bearing Indicator, displaying information from the ADF.
RDO - Radio.
RIS - Radar Information Service.
RMI - Radio Magnetic Indicator.
RMU - Radio Management Unit.
RVR - Runway Visual Range.
RWY - Runway.
RX - Receiver.

S

SAS - Stability Augmentation System.
SB - Service Bulletin.
SELCAL - Selective Calling.
SFC - Specific Fuel Consumption.
SID - Standard Instrument Departure.
SOB - Souls On Board (see also POB).
SOP - Standard Operating Procedure.
SR - Sunrise.
SRZ - Special Rules Zone.
SRA - Surveillance Radar Approach.
SRE - Surveillance Radar Element of a GCA.
SS - Sunset.

SSB - Single Sideband.
SSR - Secondary Surveillance Radar.
STAR - Standard Terminal Arrival Route, for inbound IFR traffic.
STOL - Short Take-Off and Landing.

T

TACAN -Tactical Air Navigation System.
TAF - Terminal Area Forecast.
TAS - True Air Speed.
TCA - Terminal Control Area (USA).
TCAS - Traffic Alert and Collision Avoidance System.
THR or Thld. - Threshold.
TMA - Terminal Control Area (UK)
TO - Take- Off (sometimes TKOF).
TODA - Take- Off Distance Available.
TODR - Take- Off Distance Required.
TORA - Take- Off Run Available.
TSO - Technical Standard Order.
TVOR - Terminal VOR.
TWR - Tower (aerodrome control tower).
TWY - Taxiway.
TX - Transmitter.

U

UDF - UHF Direction Finding.
UHF - Ultra-High Frequency.
UIR - Upper Information Region.
UTC - Co-ordinated Universal Time, (Greenwich Mean Time)

V

VAL - Visual Approach and Landing (chart).
VAR - Variation (magnetic)
VASIS - Visual Approach Slope Indicator System.
VDF - Very-High Frequency Direction-Finding.
VFR - Visual Flight Rules.
VHF - Very H igh Frequency.
VIS - Visibility.
VLF - Very Low Frequency.
VOLMET - Continuous recorded broadcasts of weather conditions.
VOR - Very high frequency Omni-directional Range.
VP - Variable-Pitch (propeller).
VRP - Visual Reporting Point.
VSI - Vertical Speed Indicator.

W

WP - Waypoint.
WX NIL - No significant weather, term used in Met reports.

X

XMSN - Transmission.
XPDR - Transponder.

Z

ZFW - **Zero-Fuel Weight** - maximum permissible weight of an aircraft.
ZULU or Z - Used worldwide for times of flight operations (same as UTC).

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- Experience full 3D graphic effects including sun, shadow, sunrise, sunset lighting and 3D volumetric clouds which build the ambience of the flight
- 4 different modes - Free Flight, Just for Fun, Challenges and Competition - enable the pilot to become fully familiar with the techniques of glider flights, from Beginner through Expert mode
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- Extended Artificial Intelligence provides the pilot with exciting challenges against other fellow gliders in the sky!

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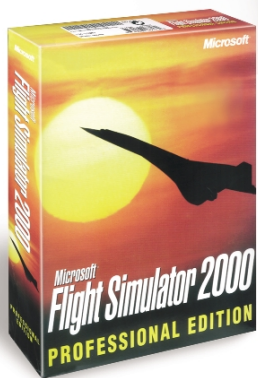
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